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TWO NEW REVENUE CUTTERS FOR SPECIAL PURPOSES*

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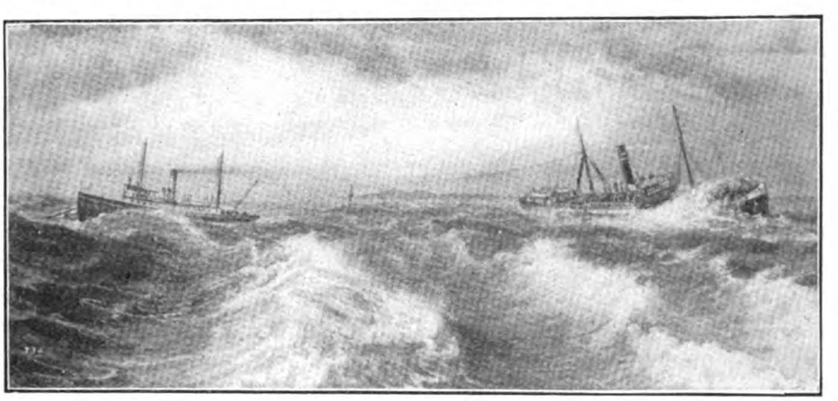
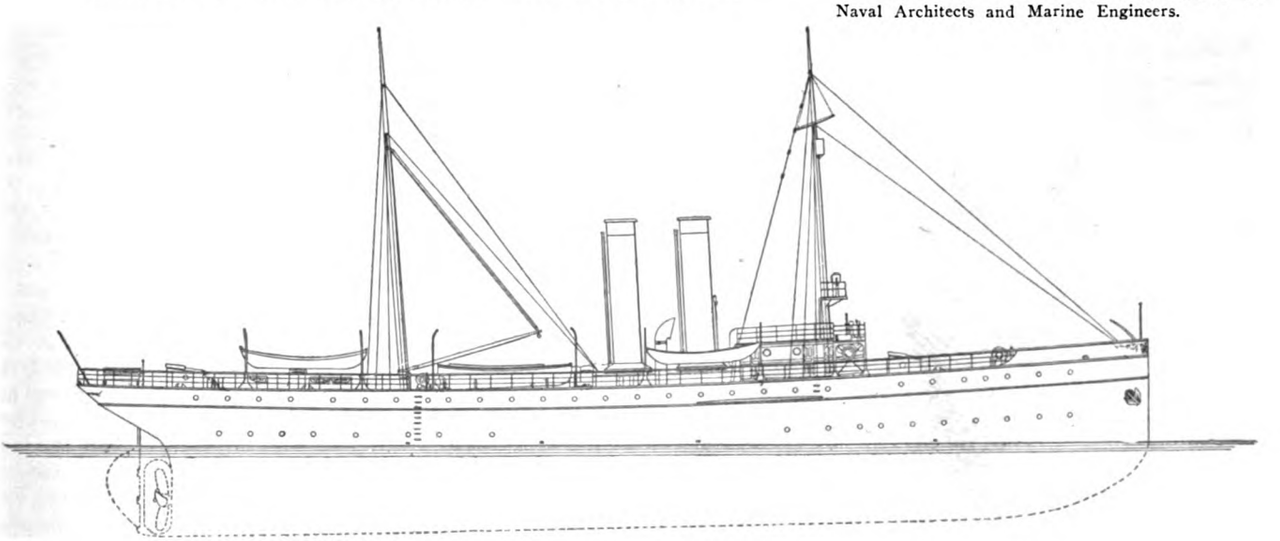
The building of a modern navy by the United States has attracted world-wide attention during the past two decades, and has been a source of much gratification to all patriotic citizens. While congress has provided liberal appropriations for new war vessels of various descriptions, it has not overlooked, entirely, other maritime branches of the government.



CABLEWAY FOR COALING SHIPS UTILIZED FOR SAVING LIFE AT SEA.

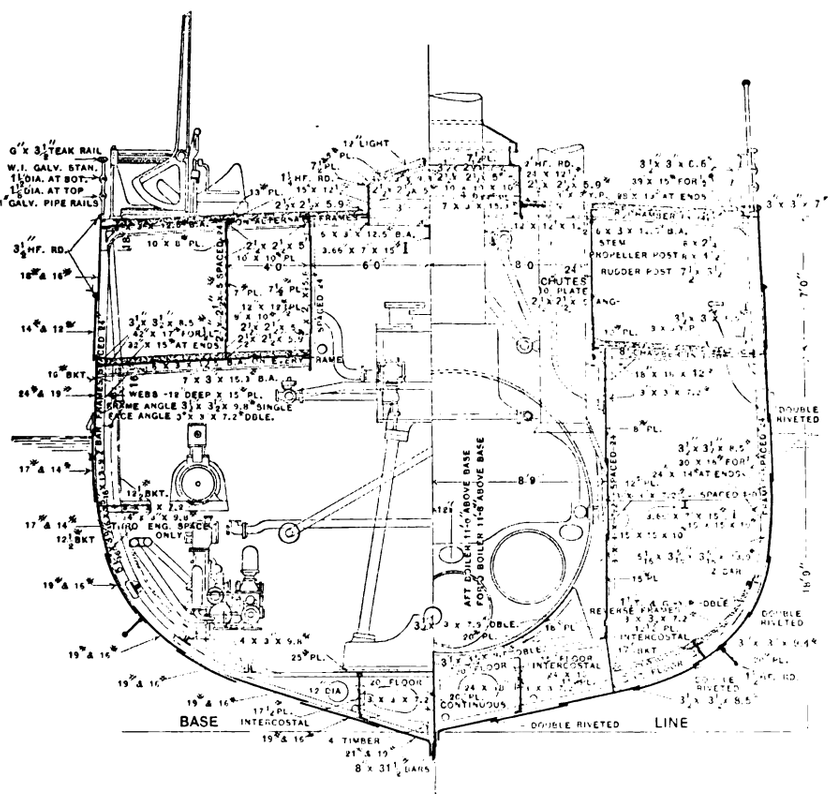
The revenue cutter service, at the time the rebuilding of the navy was commenced, was in as bad a condition in its smaller scope, so far as modern and efficient vessels are concerned, as the regular navy. Its vessels were slow, antiquated, and but ill adapted for the diversity of duties required of them. In the past 15 years, however, over two-thirds of the old fleet of cutters have been replaced by new vessels, modern in every respect, and fitted to perform efficiently their duties as revenue cutters; in addition thereto the larger cutters have been so constructed as to form valuable auxiliaries to the navy in time of war, as evidenced by the effective blockade and despatch duties performed by a num-

*Paper read at annual meeting, Society of Naval Architects and Marine Engineers.



OUTBOARD PROFILE OF DERELICT DESTROYER.

ber of them during the Spanish-American war. The rebuilding of the fleet is still in progress, and congress, during its last two sessions, has made appropriations for six additional vessels. Two of these vessels, designated during the progress of construction as revenue cutters Nos. 16 and 17, respectively, are designed for such special work as will, undoubtedly, interest not alone the members of this society, but other maritime interests as well. It is, therefore, the object of this paper to present brief descriptions, and such reproductions of the principal drawings of these craft, as will, it is hoped, give a fair idea of what has been done in designing vessels for the two fields involved.



SECTION THROUGH MACHINERY SPACE OF DERELICT DESTROYER.

REVENUE CUTTER NO. 16.

Before describing this vessel it will be well to make a brief statement as to the causes leading up to the demand made upon the government for her construction.

Those familiar with conditions existing on the Pacific coast, with especial reference to the northwestern part of the United States proper, are aware of the extreme hazards of wind, currents and fog encountered by navigators in that locality. The entrance to Puget Sound through the Straits of Juan de Fuca is particularly dangerous, as throughout at least half the year fogs and haze prevail, and at all times erratic currents exist which are but little understood, even by men who navigate these waters constantly. Deep-water soundings may be obtained close inshore, so that not much dependence can be placed on the lead and line, when vessels are headed in the straits. In point of importance this entrance undoubtedly ranks first on the Pacific coast, as it is estimated that nearly 6,000,000 tons of shipping pass through it annually. In the past half century nearly 700 lives have been lost in the immediate vicinity, to say nothing of millions of dollars worth of property. The climax came in the total loss of the coastwise passenger steamer Valencia, from San Francisco bound to Seattle, which occurred in a dense fog on the night of Jan. 22, 1906. This unfortunate vessel had overrun her distance and, failing to pick up the light at the entrance to the Straits of Juan de Fuca, had piled up on the rocks at the foot of a high cliff on an unsettled portion of the coast of Vancouver island. One hundred and thirty-six lives were lost, many of which could have been saved had the accident occurred within reach of a life saving station, or had some vessel fitted with the necessary life saving apparatus been in the vicinity, as the wreck did not go to pieces until over 36 hours after she had struck. At once the public press on the Pacific coast took up the subject of providing some means for saving lives in those waters. The president appointed a commission to investigate the cause of the wreck, and to recommend some means whereby similar fatalities could be avoided. Numerous schemes were suggested, among them being international life saving stations along the Vancouver coast. This, however, proved inadvisable, and finally, after mature consideration, the board, in addition to suggesting additional lightships, coastwise telegraph and telephone lines, fog signals, wireless telegraph, etc., recommended that "a first-class ocean-going, life-saving steamer or tug, officered and manned by the most skillful life saving crew available, should be stationed at Neah bay, which is within five miles of Cape Flattery and the entrance to the straits, and the only available harbor in that vicinity, to be equipped with the best possible appliances of surf boats and life boats, with a wireless telegraph apparatus."

Congress very shortly afterwards made an appropriation of $200,000 to carry out this recommendation; it also provided that the life saving tug should be constructed and operated by the revenue cutter service. The proper design of such a boat has presented a number of problems, as the following points had to be considered:

1. The vessel must be sufficiently large to be seaworthy under all conditions of weather.

2. An ample coal supply must be furnished to enable the vessel to keep the sea for a number of days, as it is presumed that she will be quite often called upon to search for missing vessels.

3. Every known provision must be fitted to equip her for life saving in the open sea, and for rescuing persons from wrecks on the shore.

A board of officers of the revenue cutter service was appointed to recommend a design suitable for fulfilling the above conditions, or, in other words, to provide a vessel which would be best adapted to perform the duties required. After a full consideration of the various points to be considered a design was decided upon, and the contract was awarded to the Pusey & Jones Co., of Wilmington, Del., at its bid of $189,057. The salient features of the vessel are as follows: As a sea-going life boat was, in this country at least, an entire innovation, the general design of a large sea-going tug was considered to be about the best fitted for the purpose, as this type has been well tried out and found adaptable for almost any duty. Consequently the vessel in external appearance will resemble closely numerous first-class tugs to be found on both the Atlantic and Pacific

coasts. Her interior arrangements and her equipments possess the special features which fit her for the duties to be performed. As Neah bay, the headquarters of the new craft, is about as dreary and unattractive a place as can well be imagined, considerable attention has also been given to providing as comfortable living quarters for the officers and crew as could be fitted in the limited space available.

The principal dimensions for the tug will be:

Length over all	152 ft. 0 in.
Length between perpendiculars	139 ft. 6 in.
Breadth of beam, molded	29 ft. 0 in.
Depth at side from base line amidships	17 ft. 6 in.
Displacement to mean draught of 12 ft. 4½ in. above base line, with 125 tons of coal and 11,000 gallons of water	795 tons

The hull will be constructed throughout of mild, open-hearth steel, of the best quality. An inner bottom will extend for the length of the boiler space, which, in addition to being a safeguard in case of grounding will provide a large tank capacity for water for steaming purposes. The scantlings throughout are made as heavy as practicable in order to provide staunchness and to fit the vessel for rough service. As the climate is very wet, the vessel's main deck will be of the best quality of teak, instead of the usual native pine. The hull will be divided into as many watertight compartments as is compatible with a vessel of these dimensions. The quarters for officers and crew are of ample size, and well lighted and ventilated; those for the commanding officer will be just abaft the pilot house where he can be at all times in close touch with the management of the vessel. Her boat equipment will consist of two 24-ft. metallic life boats, one 20-ft. otter boat, one 16-ft. dinghy, and one 17-ft. metallic life raft. It is also probable that a motor life boat will be provided. The life boats will be of the self-righting and self-bailing type. There will be two pole masts, with a signal yard on the foremast.

For life saving purposes there will be rigged from the mainmast a breeches-buoy arrangement operated in a precisely similar manner and by the same kind of gear as has been successfully used for coaling ships at sea. It is expected that this gear can be used effectively for a distance of 1,000 ft., which should enable the tug to rescue shipwrecked persons, with safety, from any vessel which may be stranded on a reef or on the beach.

The electrical equipment will be very complete, and will consist, in addition to the usual lighting outfit, of the Ardois system for night signaling, wireless telegraphy and two powerful searchlights, one at each end of the deckhouse. Current at 110 volts pressure will be furnished by a 15-K. W. direct-connected generator.

There will be a steam windlass, a steam steering gear and a steam gypsy for handling towing lines.

The steam machinery will consist of a vertical, direct-acting, triple-expansion, single-screw propelling engine, two boilers, one of the Scotch type and one water-tube, an independent air pump, a centrifugal circlating pump, a main and an auxiliary feed pump, fire and wrecking pump, evaporating and distilling apparatus, feed-water heater, and such other auxiliary and supplementary machinery as to make the installation complete in every detail.

The following are some of the principal data:

Indicated H. P.	1,200.
High-pressure cylinder, diameter	18 in.
Intermediate-pressure cylinder, diameter	29 in.
Low-pressure cylinder, diameter	47 in.
Stroke	30 in.
Main condenser, cooling surface	1,651 sq. ft.
Vertical, twin, single-acting air pump	8 x 16 x 12.
Main circulating engine, 24-in. runner	7 in. x 7 in. engine
Main feed pump (duplex)	8 x 5 x 12.
Auxiliary feed pump (duplex)	8 x 5 x 12.
Fire and wrecking pump (duplex)	14 x 8½ x 12.
Bilge pump (single)	8 x 9 x 10.
Feed-water heater, heating surface	120 sq. ft.
Distilling apparatus, capacity 24 hours	1,700 gal.
Boilers, working pressure	180 lbs.
Scotch boiler, diameter (inside)	13 ft. 6 in.
Length over heads	10 ft. 3 in.
Number of furnaces	3.
Diameter of furnaces (inside)	40 in.
Total grate surface	60 sq. ft.
Total heating surface	1,803 sq. ft.
Water-tube boiler (Babcock & Wilcox type).	
Length over casing at bottom	10 ft. 4 in.
Width over casing	12 ft. 9 in.
Height to center of drum	13 ft. 3 in.
Total grate surface	78.5 sq. ft.
Length of tubes	9 ft
Total heating surface	2,565 sq. ft.
Total grate surface, both boilers	138.5 sq. ft.
Total heating surface, both boilers	4,368 sq. ft.

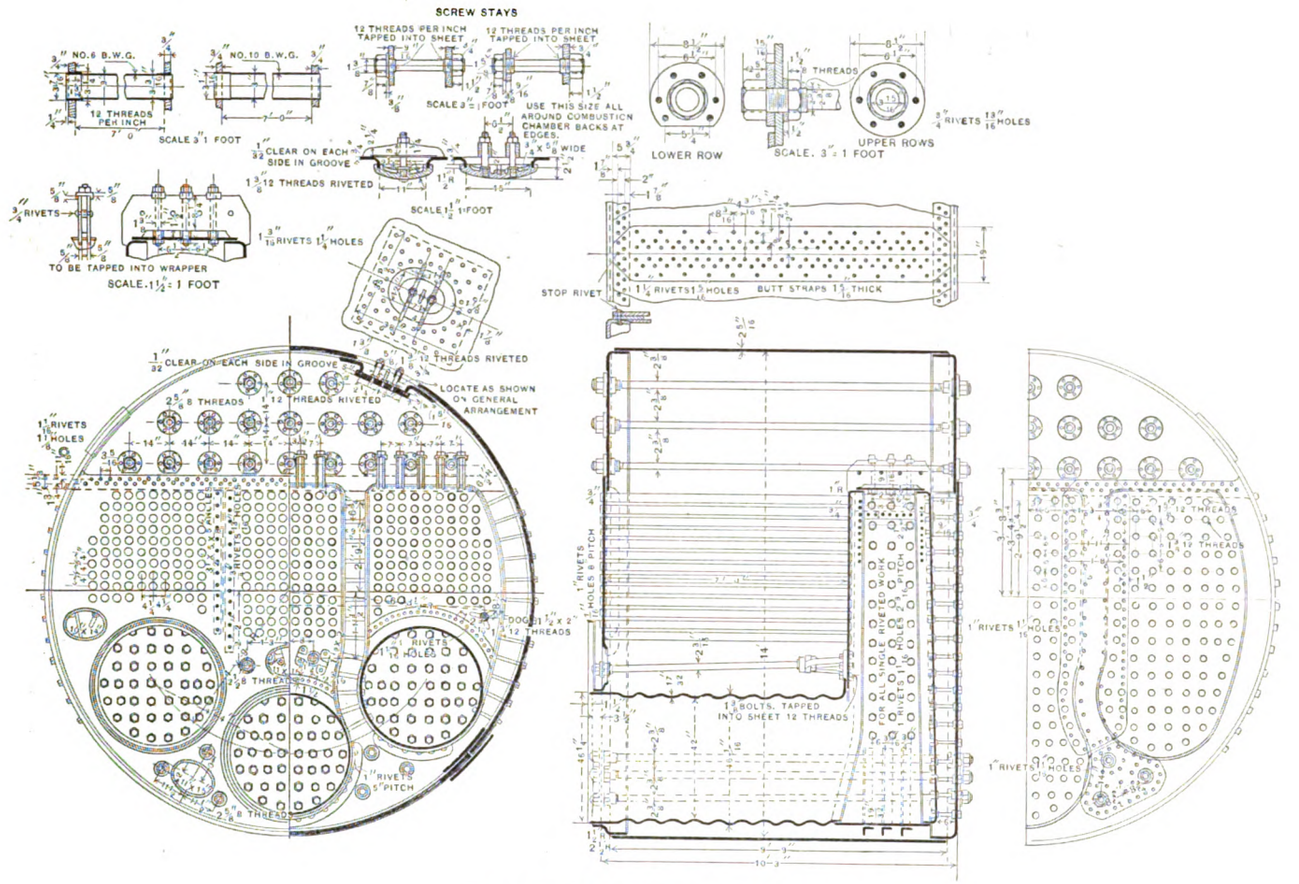
The propeller will be of manganese bronze, 11 ft. in diameter, and the mean pitch, which is adjustable, will be 11½ ft. The machinery throughout will be constructed of the highest qualities of material and workmanship, in order to minimize, so far as possible, the chances of derangement or of breakdown. There are but few special features other than that provisions are made for pumping out wrecks, and for extinguishing fires on other vessels. The fitting of one Scotch and one water-tube boiler has been quite frequently adopted, and has its disadvantages as well as its advantages. In this instance the advantages seem to predominate. The reasons for its adoption are that the vessel will be for fully nine-tenths of the time tied up at the wharf waiting for a signal of distress. If two Scotch boilers were installed, it would be necessary to keep the fires banked under both, as it is not advisable to raise steam in a Scotch boiler of this size under much less than five or six hours' time, that is, if the engineer in charge has any regard for the tightness of the seams. Banked fires in two boilers would be too expensive, so as an alternative it is proposed to keep the fires banked in the Scotch boiler at all times, except when it is necessary to clean the same, and to have the water-tube boiler primed and ready for instant use. Steam can be raised in the water-tube boiler within 30 minutes after the fires are started, so that by the time the tug will be underway from the wharf, and headed on her course, full boiler power should be available. To maintain banked fires in a water-tube boiler requires, as is well known, much closer attention than for shell boilers, owing to the much larger water reservoir in the latter type.

As vessels in that portion of the Pacific ocean are frequently overdue on account of the great duration of gales, the revenue cutter service is often called upon to go in search of them, and it is safe to assume that this life saving tug will at times be called upon for that duty. From data obtained from the log books of other cutters of about the same model and size, it is probable that the new tug will be able to steam 25 knots per ton of coal, at her economical speed. With her bunker capacity she should, therefore, be capable of steaming a distance of about 3,000 knots which should enable her to make a very thorough search for any missing craft. Although the designed speed of the new vessel is but 12 knots, there is little doubt that, with her comparatively large boiler power, she should, in an emergency, be capable of making between 13 and 14 knots.

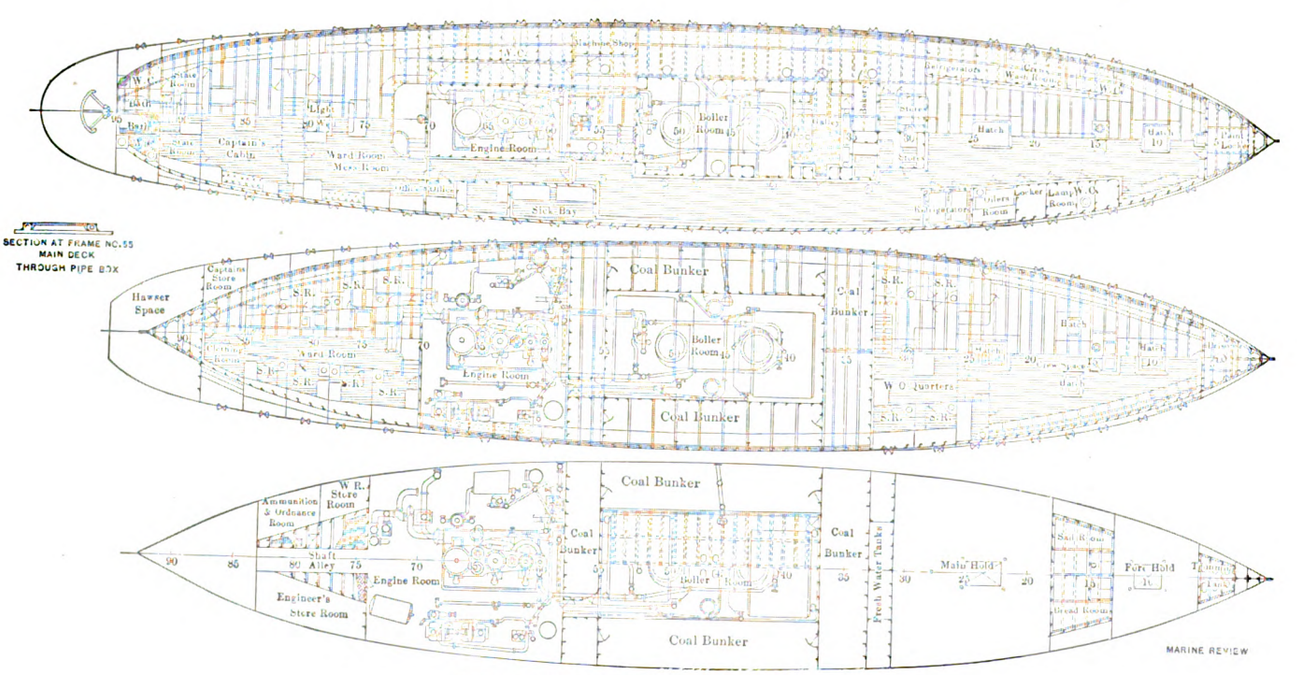
It is believed that the design contemplates the furnishing of every known device of any practical value, which can be of service in saving life at sea. Summarized, the special equipments of this vessel are as follows:

1. Two self-bailing and self-righting life boats.
2. Life raft.
3. Line throwing gun.
4. Breeches-guoy apparatus.
5. Complete equipment of life buoys and life preservers.
6. Wireless telegraphy.
7. Ardois system for night signaling.
8. Additional searchlight.
9. Wrecking apparatus for pumping out vessels.
10. Fire extinguishing apparatus.

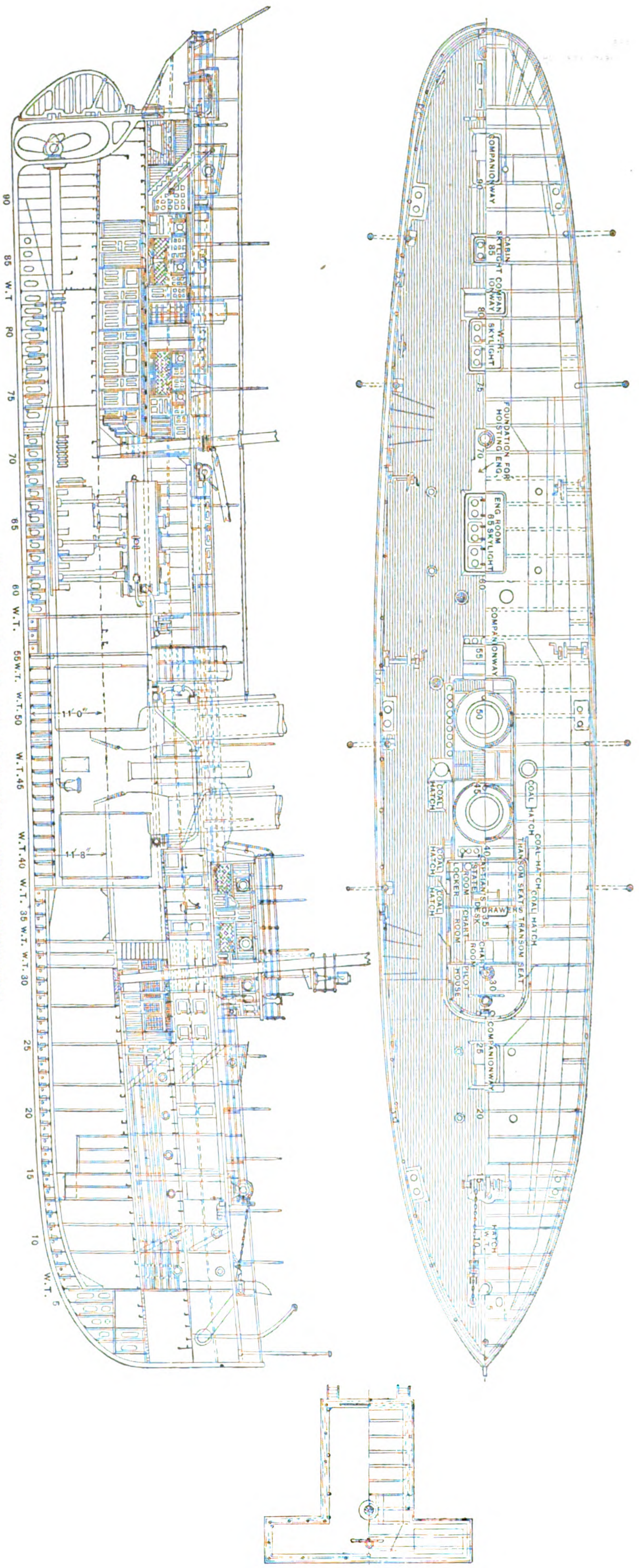
As already stated herein, the designing of so large a vessel for life saving duty at sea is an entirely new field for naval architects, in this country at least, and while it is not claimed that perfection has been reached by any means, it is thought that every precaution has been



BOILER DIAGRAM OF DERELICT DESTROYER.



DECK VIEWS OF DERELICT DESTROYER.



INBOARD PROFILE AND DECK VIEW, DERELICT DESTROYER.

taken to make the vessel a success, at least so far as it lies within the practical knowledge and experience of those interested in designing the craft. The saving of life at sea is a subject which should appeal to all persons interested in maritime affairs, and it is hoped that, among the members of this society there may be some who will advance suggestions or criticisms which may be of value.

REVENUE CUTTER NO. 17.

This vessel has been designed and is intended for exclusive use as a derelict destroyer in the North Atlantic ocean.

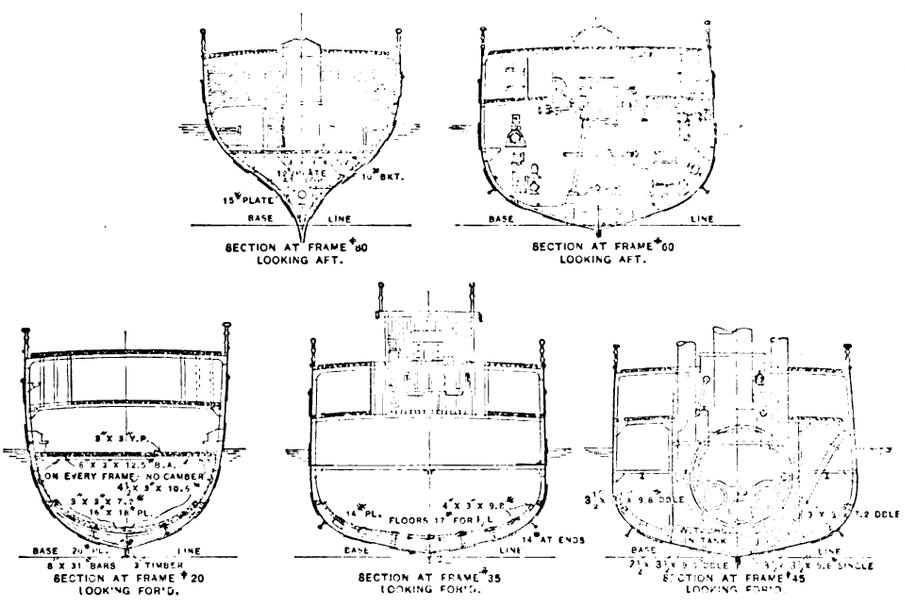
Floating wrecks, or derelicts as they are commonly termed, drifting aimlessly in the paths of ocean-going vessels, have been a constant menace to seafaring men for years past. To the men on the bridge of a fast trans-Atlantic passenger steamer, the thought that at any moment they may crash into a half-submerged wreck and cause the loss of their vessel is anything but comforting. Other ships in their path at night are discernible by lights, or can be located by signals in fogs; even icebergs make their presence known by lowering temperatures, but the specter-like derelict gives no indication of its whereabouts. The danger of collision with these floating obstructions is known to all who travel by sea, yet until this time no systematic effort has ever been made to rid the ocean of these menaces to navigation. True it is that at every international maritime conference held within recent years, resolutions have been passed and agreements made that each government represented at the conference would at once take up the matter, but the old saw "What is everybody's business is nobody's business" seems to have overcome good intentions in this respect. In this country special cruises have been made from time to time in search of some particularly dangerous derelict, and within the past few years the revenue cutter service has systematically blown up all sunken derelicts which have been reported as dangerous to navigation along the Atlantic coast.

The United States government, always foremost in any movement to promote the interests of humanity, has finally decided to be the pioneer in what is hoped will be an international system for removal of derelicts from the most frequented paths of ocean travel. To that end congress recently passed a bill, appropriating $250,000 for the construction of a vessel to be used exclusively for derelict destroying. This was brought about only after the most earnest efforts on the parts of the several maritime associations and the steamship owners of the ports of New York, Boston and Philadelphia; to these organizations is

largely due the credit of convincing congress as to the necessity for such a vessel.

The carrying out of the intention of congress involves a subject upon which considerable thought will have to be expended. The locations and drift of derelicts have for some time past been noted on the monthly pilot charts issued by the United States hydrographic office, so that a fair idea can be formed of the field of operations for the new vessel. Generally speaking, it can be said that the greatest number of them will be found in or near the gulf stream, in the spherical triangle whose vertices are Nantucket South Shoal lightship, Fastnet rock on the Irish coast, and the Azores. This area, it will readily be seen, includes the lanes traversed by nearly all the trans-Atlantic steamers. The derelicts which originate outside the above boundaries are rapidly swept by the gulf stream into this triangle. As to the methods to be employed in locating these ocean wanderers much will depend upon the experience to be gained in the first few attempts. It is thought, however, that schemes can be devised whereby the destroyer can be unmistakably recognized day or night by passing vessels, so that information can be conveyed to her, through the medium of wireless telegraphy or signaling, as to the whereabouts of the derelict sought, or of others not before reported. This would involve the issuance of comprehensive circulars to all steamers crossing the Atlantic, which will contain a description of the destroyer and her distinctive marks, her call letters by wireless telegraphy, a prearranged code for various methods of signaling, and such other information as may from time to time be found advisable for the purpose. It may also prove efficacious if bulletins are issued to all outgoing vessels giving information as to the probable whereabouts of the destroyer and a description of the particular derelict for which she may at the time be in search.

After the derelicts are discovered, the methods of destruction or of removal to be adopted will require excellent judgment on the part of the officer in command of the cutter. It is probable that nearly half of all floating wrecks encountered in the North Atlantic are lumber laden. Experience has taught the futility of attempting to blow up such obstructions: even if they could be successfully blown up it would tend to aggravate the trouble, for instead of having the mass of timber confined in one hulk, it would ofttimes liberate numberless logs or large sticks of timber, which in themselves constitute dangerous obstructions for fast vessels to strike. It is highly probable then that wrecks containing lumber will have to be towed to the nearest land where they can be beached or securely moored until disposed of otherwise. In some instances, it might be found advisable to burn these relics of lumbermen, but even with this method a number of unburned logs would be bound to get adrift. Iron or steel vessels loaded with heavy cargoes can be readily blown up and sunk by carefully placed mines of gun-cotton or dynamite. Many officers of the revenue cutter service have already had experience in handling mines at sea, and of securing them to wrecks from open boats; hazardous as is this operation the records do not show a single accident from that source. Many instances there are where undamaged and seaworthy vessels have been abandoned at sea through fear of impending shipwreck. Should the destroyer meet with any such, it is more than probable that they would be towed to the nearest port and restored to their owners, thus accomplishing an act beneficial alke to public and private interests.



SECTIONAL VIEWS OF DERELICT DESTROYER.

It will readily be understood that the cardinal features in the designing of a vessel for this purpose must embrace the following:

1. Seaworthiness, and ability to keep the sea under all conditions.
2. As great a coal endurance as possible, in order to provide a large radius of action.
3. Towing ability.
4. Carefully designed magazines for the safe carrying of high explosives, and efficient gear for handling the same.

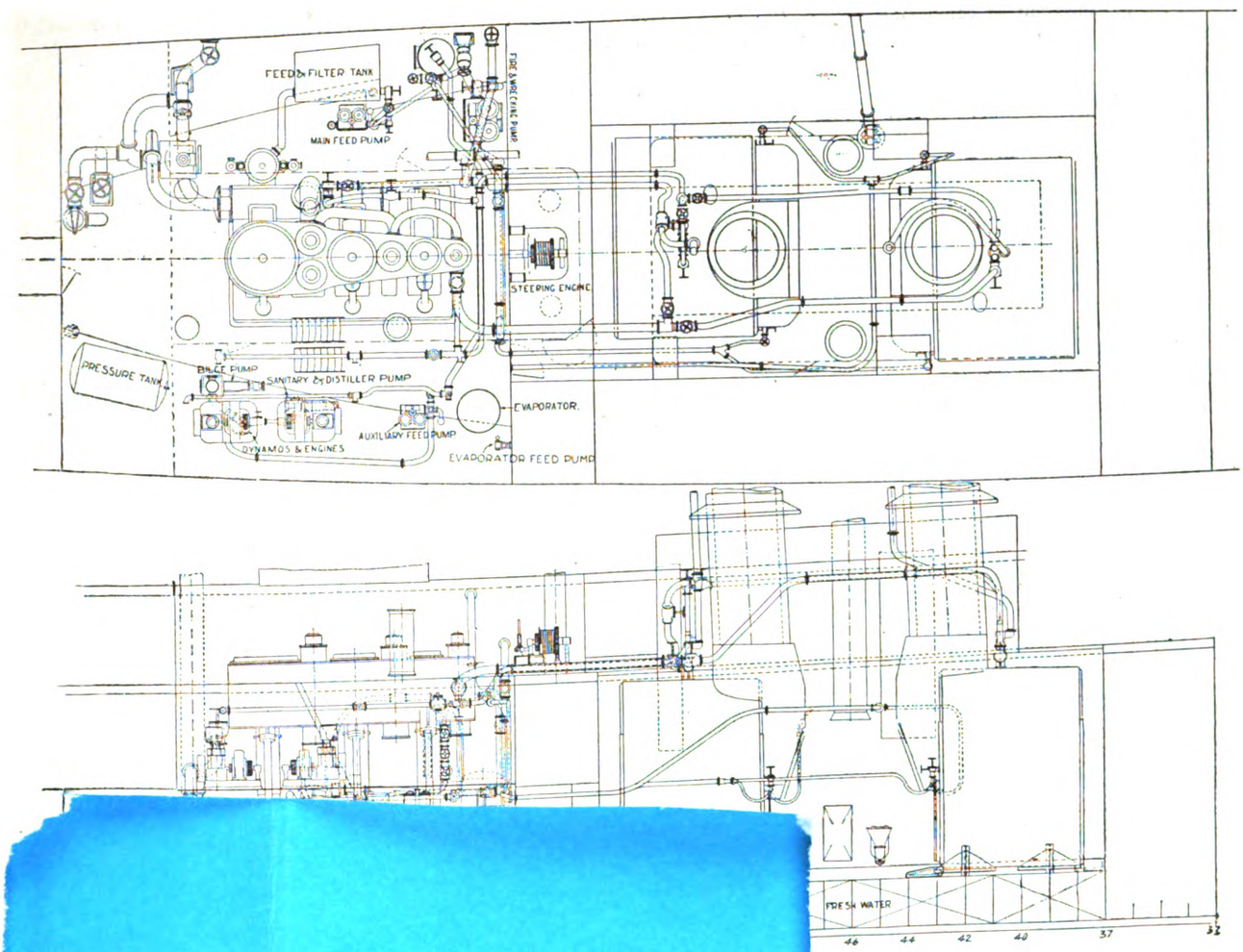
At the outset it is well to state that the designers of the vessel were considerably hampered by the limit of cost, which was placed at $250,000, by the act providing for her construction. Those who have had recent experience in placing contracts for ship construction, or, in fact, for almost anything else, will realize that, owing to the greatly increased cost of labor and materials, $250,000 will not build a very large ship of this type. Consequently the plans as finally adopted contemplate a single-screw vessel of only 1,480 tons displacement, as that was the very largest tonnage which could be built for the money available. The general dimensions of the hull are as follows:

Length over all	204 ft.
Length between perpendiculars	186 ft.
Breadth of beam molded	34 ft.
Depth at side from base line amidships	25 ft. 9 in.
Mean load draught	15 ft. 6 in.

At the draught given above the vessel will carry 300 tons of coal and 26,500 gallons of fresh water.

The vessel will have a straight stem, an overhanging elliptical stern, three decks, the upper of which or spar deck will be flush fore and aft. Around the spar deck will be a guard rail, which will be formed of galvanized wrought iron stanchions, a teak top rail and wrought iron intermediate rails. She will have two pole masts, each 73 ft. long; on the foremast there will be a signal yard and a crow's-nest. She will carry a mainsail, main staysail, foresail and fore staysail, all of which will be used for steadying purposes with the wind abeam. There will be a small steel deckhouse around the foremast, containing the pilothouse, chart room, and a stateroom for the use of the commanding officer in stormy weather.

The hull will be constructed of mild



DESTROYER.

fortably swung there in hammocks.

The deck auxiliaries will consist of a steam windlass, steam steering engine and a steam winch for handling hawsers or for operating the cargo boom. There will be six boats, including a surf boat and a power launch.

Current for the electric installation will be furnished by two 10-K. W. direct-connected generators, which can be operated independently or together, an equalizer being fitted. In addition to lighting the

very high speed. In order to make her coal supply last just as long as possible she should be cruised at her economical speed. An examination of diagrams showing the economical speed of 71 vessels of all classes in the United States navy discloses the fact that, with the exceptions of several torpedo boats, this averages below 10 knots; the economical speed of the destroyer cannot, therefore, be in excess of 11 knots with a clean bottom, 10 knots with the bottom in fair condition, and nine knots when the bottom is ordinarily foul. Therefore, it would be advisable to fit an engine capable of driving the vessel not in excess of 11 knots, were cruising conditions only to be considered. However, as the vessel must necessarily be used at times for towing, it was decided to install an engine capable of indicating 1,500 H. P. under maximum conditions, which will give her a speed somewhat in excess of 12 knots should it become necessary to steam her at that rate, and at the same time provide reserve power for towing at lower speeds.

In the design of the main engine great care was taken to secure as economical results as possible for the type decided upon. To that end a cylinder ratio of 1 to 6.76 was adopted, as was also a comparatively long stroke; piston valves are fitted to all three cylinders, and it is believed that by the peculiar arrangement of valve chests (shown on the accompanying drawing) the clearance spaces are reduced to as small an amount as possible, even less than with the ordinary flat slide valves. The air pump, feed pump and bilge pump are operated by

beams from the low-pressure crosshead, so that while cruising the only auxiliaries in operation using steam direct will be the circulating pump and the dynamo. At sea the vessel can be steered by the hand gear in order to save the steam used by the steering engine. Steam at 180 lbs. working pressure will be furnished by two single-ended boilers of the Scotch type, designed to operate entirely by natural draft.

The following are some of the principal data for the machinery outfit:

Indicated H. P.....	1,500.
Working steam pressure	180 lbs.
High-pressure cylinder, diameter	20 in.
Intermediate - pressure cylinder, diameter....	32 in.
Low - pressure cylinder, diameter	52 in.
Stroke	36 in.
Main condenser, cooling surface	2,092 sq. ft.
Main air pump, attached	21 in. x 15 in. stroke.
2 main feed pumps, attached	3 in. x 15 in. stroke.
2 main bilge pumps, attached	3½ in. x 15 in. stroke.
Main circulating pump, 26-in. runner	8 in. x 8 in. engine.
Main feed pump (independent duplex)	8 in. x 5 in. x 12 in.
Auxiliary feed pump (independent duplex)....	8 in. x 5 in. x 12 in.
Fire and wrecking pump (duplex)	14 in. x 8½ in. x 12 in.
Bilge pump (simplex horizontal)	8 in. x 9 in. x 10 in.
Distiller circulating and flushing pump (simplex)	5 in. x 7 in. x 7 in.
Feed-water heater, heating surface	120 sq. ft.
Main boilers (two), diameter (inside)	14 ft.
Length over heads.....	10 ft. 3 in.
Number of furnaces...	3.
Grate surface (one boiler)	63 sq. ft.
Heating surface (one boiler)	1,930 sq. ft.
Total grate surface....	126 sq. ft.
Total heating surface..	3,860 sq. ft.
Ratio H. S. to G. S..	30.6 : 1.

The propeller will be of the built-up type, having four blades; the diameter will be 11 ft. 6 in., and the pitch adjustable between 13 ft. and 15 ft. Suction hose will be fitted to the wrecking pump, so that it can be used for pumping out wrecked vessels, and ample provisions of fire apparatus will be furnished for extinguishing fire on other vessels, in case such a contingency should arise. An abundant supply of fresh water will be carried in large tanks located in the fore hold, and in the double bottom under the boiler compartment. In addition there will be a complete evaporating and distilling plant, so that in case of necessity fresh water could be furnished to vessels at sea should any such be found whose water supply had run low. It is the intention to equip the destroyer with a small machine shop, containing a lathe, shaper, drill press and all necessary small tools for making repairs to her own machinery while at sea, and in case of necessity for lending assistance in that respect to other vessels in urgent need.

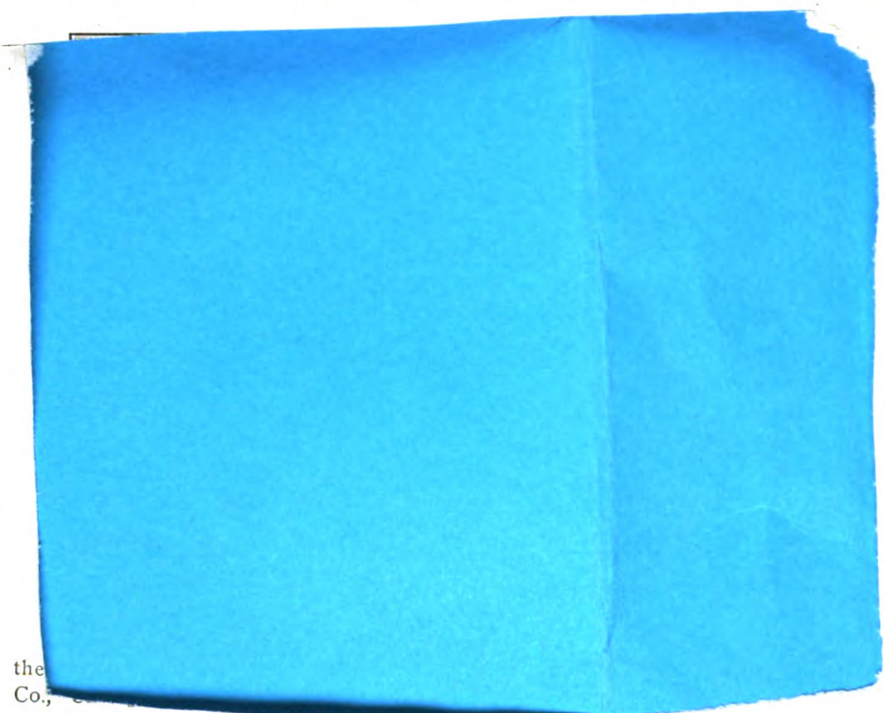
In time of war the derelict destroyer would prove of value for co-operation with the army in planting mines at the entrances to the various seaports.

As this vessel is the first of the type ever to be constructed, it is not expected that the design is perfect, but there is no doubt but that she will fulfill the object for which she is constructed. A year or more experience in this particular line of duty will unquestionably develop minor faults, but it is hoped that they will be such as can readily be remedied in this first attempt, and serve as a guide for future derelict destroyers which it is expected will be constructed by other maritime powers.

The new vessel, which has not as yet been named, is now being constructed by the Newport News Ship Building & Dry Dock Co., and it is confidently expected that she will be completed and ready for duty by July 1, 1908.

LENGTHENING THE STEAMER PURITAN.

An interesting piece of reconstruction work has just been finished by the Manitowoc Dry Dock Co., of Manitowoc, Wis., in the lengthening of the steamship Puritan, owned by



the
Co.,
the vessel's passenger and freight capacity the owners decided to lengthen her about 40 ft. and George L. Craig was commissioned to prepare plans and specifications for same.

On Oct. 31, 1907, the vessel was placed in the graving dock of the Manitowoc Dry Dock Co., and the work of cutting apart commenced. This was a difficult job owing to the fact that the lowest point of shear and the greatest beam did not come at the same point on the vessel.

On Nov. 9 the vessel was ready to pull apart and the necessary tackles adjusted. It required just 40 minutes to move the forward end ahead 40 ft. This was then securely shored up and the work of filling in begun.

The new shear line was first faired and then the cabin deck shear strake marked off, punched and erected. The cabin deck beams and deck stringer were then put up, thus enabling the upper cabin work to proceed while the under steel hull was being built. By this novel plan much time was saved and the boat floated out of the dry dock on Jan. 18, 1908.

The steamer State of New York which has been running from Buffalo to Crystal Beach for the past two or three years will in all probability operate between Detroit, Bay City and Saginaw during the coming season. At any rate the directors of the D. & C. line have approved of this plan. The State of New York will probably run an excursion every Sunday from Bay

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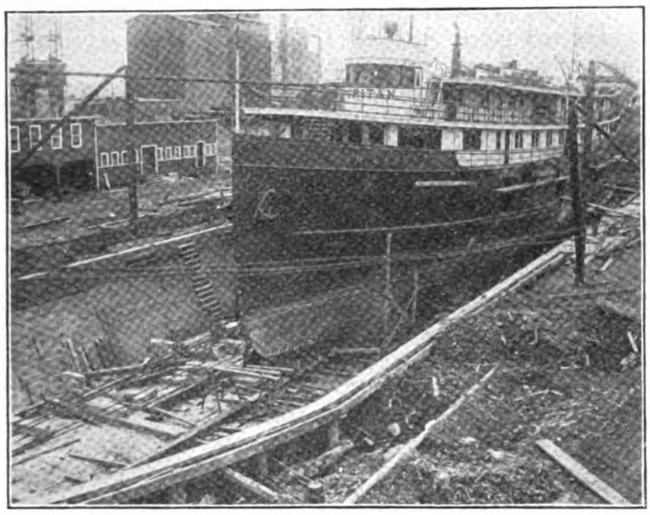
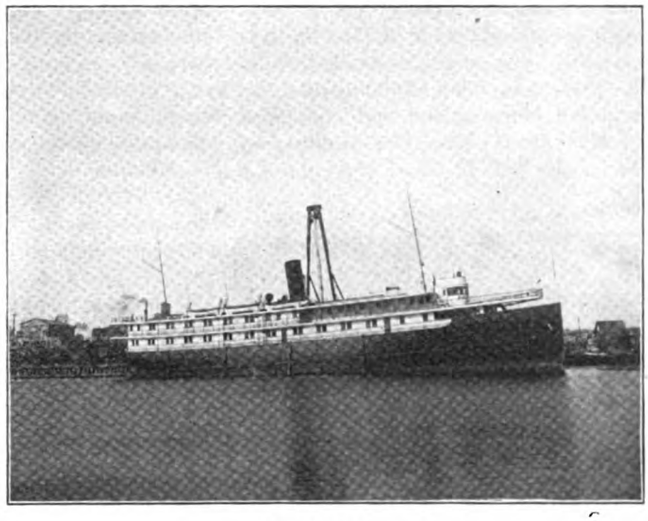
The Cleveland lodge of the Ship Masters' Association has moved into its new quarters on Superior street. They are the finest lodge rooms on the lakes.

The Triton Steamship Co. has been incorporated to operate the bulk freighter H. P. Ranney.

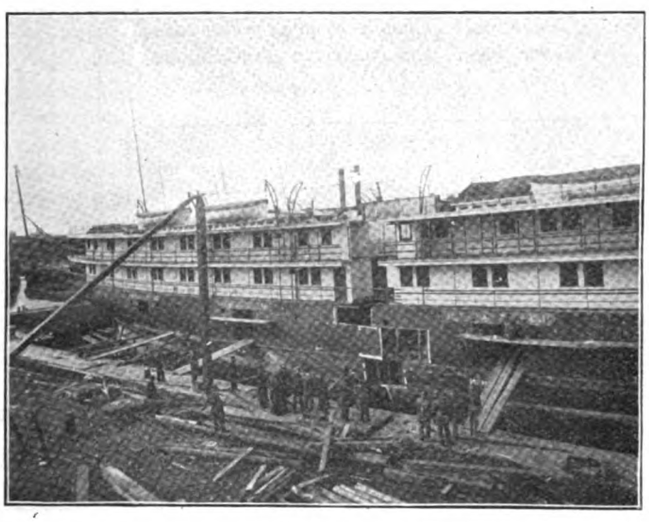
LENGTHENING THE STEAMER PURITAN



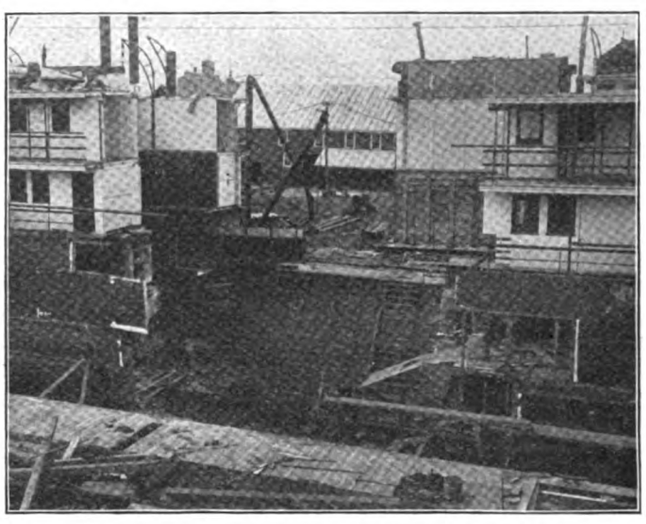
SHOWING WAYS AND SLIDES.



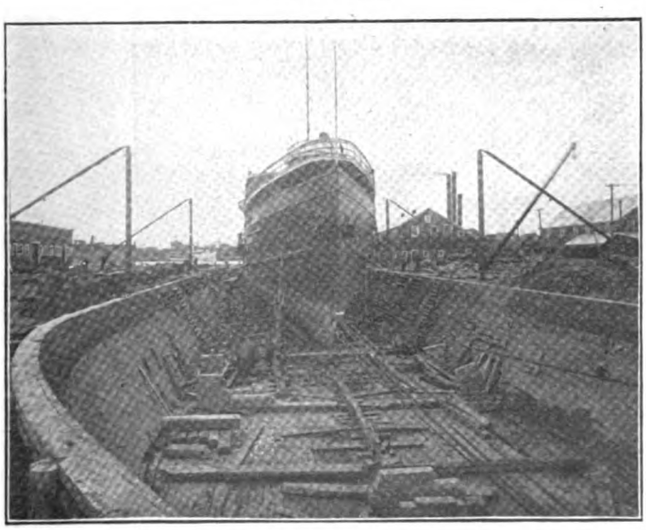
BEFORE LENGTHENING.



MOVING APART.



FORWARD AND AFTER ENDS IN POSITION.



ARRANGEMENT OF TACKLE.

RUNNING THE SHEAR LINES.

LAUNCHING THE J. E. UPSON

In presence of thousands of persons, the bulk freighter J. E. Upson was launched from the Cleveland yard of the American Ship Building Co. on Saturday morning and was christened by Mrs. E. H. Churchill, daughter of the man in whose honor the ship was

MRS. E. H. CHURCHILL, SPONSOR.

named. Mr. Upson is president of the Wilson Transit Co., owners of the vessel, but he is better known as the president of the Upson-Walton Co., which has been continuously in business for the past 37 years and has fitted out more vessels than any other ship chandlery house in the United States. Following the practice of the Cleveland yard the Upson went overboard on time, in fact anticipating the time schedule by a few minutes. Mrs. Churchill made a very clean break of the bottle, baptizing not only the ship but also quite a number of spectators on the launching stand.

The Upson is 524 ft. over all, 504 ft. keel, 54 ft. beam and 30 ft. deep. Her engines are triple-expansion with cylinders 23, 38 and 63 in. diameters by 42-in. stroke, supplied with steam from two Scotch boilers, 14½ ft. by 11½ ft., fitted with Ellis & Eaves draft and allowed 180 pounds pressure. Capt. J. S. Wood will be her master and Fred Harmon her chief engineer.

The luncheon at the Union Club following the launching of the steamer was marked by exquisite attention to details and was in perfect taste throughout. To begin with the banquet room was beautifully decorated, the tables being literally buried beneath a wealth of roses, tulips, daffodils, carnations, sweet peas and ferns. Certainly no such floral display has ever marked a launching before. The room, being artificially darkened, the illumination was by candle light. J. W. Walton acted as toastmaster and acquitted himself well. Naturally his opening remarks were a tribute to his partner whom he had known since boyhood and had never known him to betray a trust. He felt that he might be more free to speak were Mr. Upson absent and he could not propose any better toast to the ship than that she might steer as straight a course as her namesake.

Mr. Upson, in responding, said that the Wilson Transit line had been organized as a corporation since 1890. Capt. Thomas Wilson was its guiding spirit until his death in the Holy Land in 1900. The conservative policy of Capt. Wilson has never been departed from by the company, it being practically alone among the steamship companies on the lakes in that it issues no bonds upon its new vessels but provides the total sum in cash for their construction. The company, while it has never tried to make a record in speed, carrying capacity, etc., does not fail to quiet its stockholders by an occasional dividend. Regarding the steamer J. E. Upson, however, with Capt. Joseph Wood in command, Fred Harmon in the engine room and Capt. Morton in the office, an exception might be noted, and that it is expected that the J. E. Upson will not be found at the tail end of any procession. He added that while the Wilson Transit Co. had lost ships it had never lost a crew. He proposed a toast to the success of the new steamer and hoped that she would get 60 cents on coal to Milwaukee, 3 cents on corn from Chicago and $1 on ore from Lake Superior in 1908.

Capt. Wood and Chief Engineer Harmon responded briefly to toasts and then Russel C. Wetmore, vice president of the American Ship Building Co., spoke. Mr. Wetmore stated that the launching marked the conclusion of nine years of existence of the American Ship Building Co. as an incorporated body. During the nine years ended Feb. 29, 1908, they had launched 271 vessels, an average of 30 a year. He could do no better than to wish that the one which they had just seen launched would be the most successful of them all. He proposed a toast to the sponsor, who responded quite wittily by saying that

MR. J. E. UPSON.

she thought she had already made at the launching the only speech that she was required to make.

Rev. Dr. J. D. Williamson paid a very feeling tribute to the late Capt. Thomas Wilson. In fact the spirit of Capt. Thomas Wilson may be said to have animated the occasion as the references to him throughout the entire dinner, which were many, were spontaneous and tender. Dr. Williamson said that Mr. Upson had been a worthy successor in the office which Capt. Wilson held with the Wilson Transit Co., bearing a name which everyone holds in the highest esteem.

Col. J. J. Sullivan, who has for years taken a profound interest in the business of the lakes, made an address which proved his wide knowledge of industrial conditions on the lakes. He regarded the launching of a ship as a most important event in commercial life. There are many things to be considered before such an event can be brought about, not the least of which are the exactions of finance. He thought that the Wilson Transit Line occupied an exceptional position among steamship companies in that it did not have to resort to an issue of bonds. The line is well managed, always earning and always paying a good dividend. He had been associated with Capt. Wilson as a stockholder and director for many years and had never in his life met with a man of such high ideals, his word being as good as any bond that could be given. He regarded the steamship company founded by Capt. Wilson as not second to any on the lakes and that as its presiding officer Mr. Upson had most worthily sustained the reputation of its founder. Incidentally he paid a tribute to Capt. Edward Morton, the commodore of the Wilson fleet and the manager of the business.

Going more deeply into the discussion Col. Sullivan mentioned that the city of Cleveland occupied a most enviable position in the industrial world and that Cleveland men had practically financed the enormous iron business of the great lakes. It was they who had developed the infinite mineral resources of the Lake Superior country which had done so much to lift the United States into the premier place among the industrial nations of the world. The great lakes transported 80 per cent of all the iron ore that is consumed in the United States. The iron and steel business is the great barometer of trade and Col. Sullivan thought it an enviable distinction that Cleveland capital had contributed to build up a business that has not its equal elsewhere in the world.

F. H. Lyman, of the Upson-Walton Co., referring to Mr. Wetmore's remark that the American Ship Building Co. had during the nine years of its corporate existence constructed 271 ships, said that of these 271 ships 200 of them had been fitted out by the Upson-Walton Co. and he thought it was saying a great deal to say that the equipment of the ships was as good as the hull.

THE LAUNCHING PARTY ON THE STAND.

IMMEDIATELY AFTER THE LAUNCHING.

Capt. Edward Morton said that the Upson would not be stranded if she steered as straight a course as the man after whom she was named.

Oliver Upson was called upon to respond to the toast "The Steamer of the Future." In doing so he displayed an intimate knowledge of the lake ship and its peculiar adaptability to the business in which it is engaged. He felt that the hull had undergone all possible evolution to make it an economical and perfect machine. There are no beams, stanchions or any impediments whatever to the handling of cargo in a modern lake freighter. He also felt that the limit of size had been reached both as to length and beam, referring to one ship of extreme beam that has to be winded around at the docks in order to receive an equal distribution of cargo. It seemed to him, however, that development in the engine room had scarcely started. The first engine installed on a lake steamer was a single cylinder. Economy was later obtained by compounding the engine and while additional cylinders have been added later, the principle remains practically as it was in the beginning with the exception that tur-

bines have been developed for fast speed. He believed the next 10 years would see great advances in the development of internal combustion engines, doing away with boilers and, in some instances, with coal bunkers, increasing carrying capacity while at the same time lessening the cost of propulsion. He mentioned an internal combustion engine that he had seen running for eight days and nights without stopping at an operating cost of 20 per cent of that of the ordinary type of sationary engine. He felt that the adoption of this form of power to the ship would be successfully solved in the near future.

Capt. Symes spoke briefly.

J. M. Richardson made an easy and graceful talk in which he expressed his surprise that while nearly all of the speakers had been nautical men practically not a single nautical term had been used. Mr. Walton took occasion to remark that nautical terms were no longer used except in novels while at the same time he remembered the fact that the old chanties had also gone out. Thirty years ago it was common to hear the sailor chanting at the capstan, but now all this work is done by steam.

The banquet was brought to a close by Mr. Upson thanking everyone for their attendance.

In the launching party were: Mr. and Mrs. Paul, of Norwalk, Miss Clark, of Montreal, Miss Brooks, of Maryland, Mr. and Mrs. C. G. Watkins, Mrs. Frank Stearns Jr., Mr. and Mrs. A. P. Churchill, J. W. Corbusier, Mr. and Mrs. Charles A. Moriarty, E. A. Walton, Mrs. W. O. Osborne, Mr. and Mrs. R. D. Grant, J. N. Richardson, Mr. and Mrs. E. N. Dewey, Rev. J. G. Williamson, Capt. and Mrs. Joseph Wood, Capt. and Mrs. Symes, Thomas Wilson, Wm. Wilson, C. R. Doty, H. F. Lyman, E. A. Walton, Capt. Ed. Morton, Oliver Upson, J. W. Walton, Col. J. J. Sullivan, Russel C. Wetmore, Robert Logan, H. N. Herriman and Fred Harmon.

Work upon the steel collier Prometheus is progressing rapidly at the Mare island naval station. It is expected that she will go into commission during the latter part of year. The dimensions of the collier are: Length over all, 450 ft.; beam, 55 ft.; draught, 34 ft. She will have two sets of triple-expansion engines.

LAKE SHIP YARD METHODS OF STEEL SHIP CONSTRUCTION.

BY ROBERT CURR.

Before launching the stern pipe, wheel shaft and wheel are finished.

The thrust shaft and bearing are put in and lined up on coupling of wheel shaft and bolted up as soon as the vessel is moored to the dock after launching.

The bed plate, crank shaft, frames, crossheads, connecting rods, reverse shaft, links, eccentric rods and eccentric as well as the cylinders with valves and heads and air pump, channel plate and condenser are put in in one piece, three lifts completing all these pieces.

The engine is lined up to suit the coupling of the thrust shaft.

Some very good records have been made in getting in the machinery and putting vessels to sea.

The best record known on the great lakes was accomplished by Mr. Calder at their ship yard, Toledo, on the steamer Smith Thompson.

The Smith Thompson was launched at Toledo, June 29, 1907, at 9 a. m., and 45 working hours later the machinery was all in place and the steamer had undergone its dock trial.

This beats by three hours the record made in installing the machinery of the steamer Powell Stackhouse at the Orleans street yard of the Detroit Ship Building Co. in August, 1905, under the superintendency of Chas. B. Calder, now general manager of the Toledo Ship Building Co., Toledo, O.

The daily record of this performance on the Smith Thompson is quite interesting and is as follows:

Saturday, June 29—Steamer launched at 9 a. m., boilers hoisted in and breeching on by 5 p. m.

Sunday—Started work at 7 a. m., and at 6 p. m., the entire engine and spars were hoisted on board, engines and boilers set in place ready for fastening down and piping up.

Monday—Connected up steam pipes, main and auxiliary feed pipes and hoisted in stack.

Tuesday—Filled the boilers and put on preliminary pressure preparatory to having the United States inspectors test the boilers on Tuesday afternoon.

The inspectors however, were called out of city and did not reach the ship yard to inspect the vessel until Wednesday.

Wednesday—Steam up, main engines running and dock trial concluded 5 p. m., being 45 working hours from the time the men started hoisting the machinery.

The main engine could have been working Wednesday morning had it been possible for the inspectors to have inspected the boilers on Tuesday afternoon.

The Toledo Ship Building company has a remodeled plant and is perfection in arrangement for handling material.

Every part of the yard is commanded by electric and locomotive cranes and material can be handled with the utmost convenience, facility and economy.

This company has two dry docks, one 600 ft. long, 105 ft. wide at the top, 72 ft. width of blocks and 80 ft. width of gate; the other is 650 ft. in length, 110 ft. wide on top, 72 ft. wide on blocks, with an 80 ft. gate.

Electric traveling cranes are used for the dry docks as well as a 10-ton locomotive crane with a 50-ft. reach.

The pumping station built entirely of concrete has been erected at the foot of the dry dock, connected by a tunnel with the old dry dock also, so that it can fill and empty both of them.

One of the two building berths is capable of accommodating the heaviest passenger vessel on the great lakes.

The punch shop is located at the end of the new dry dock and is 300 x 110 feet.

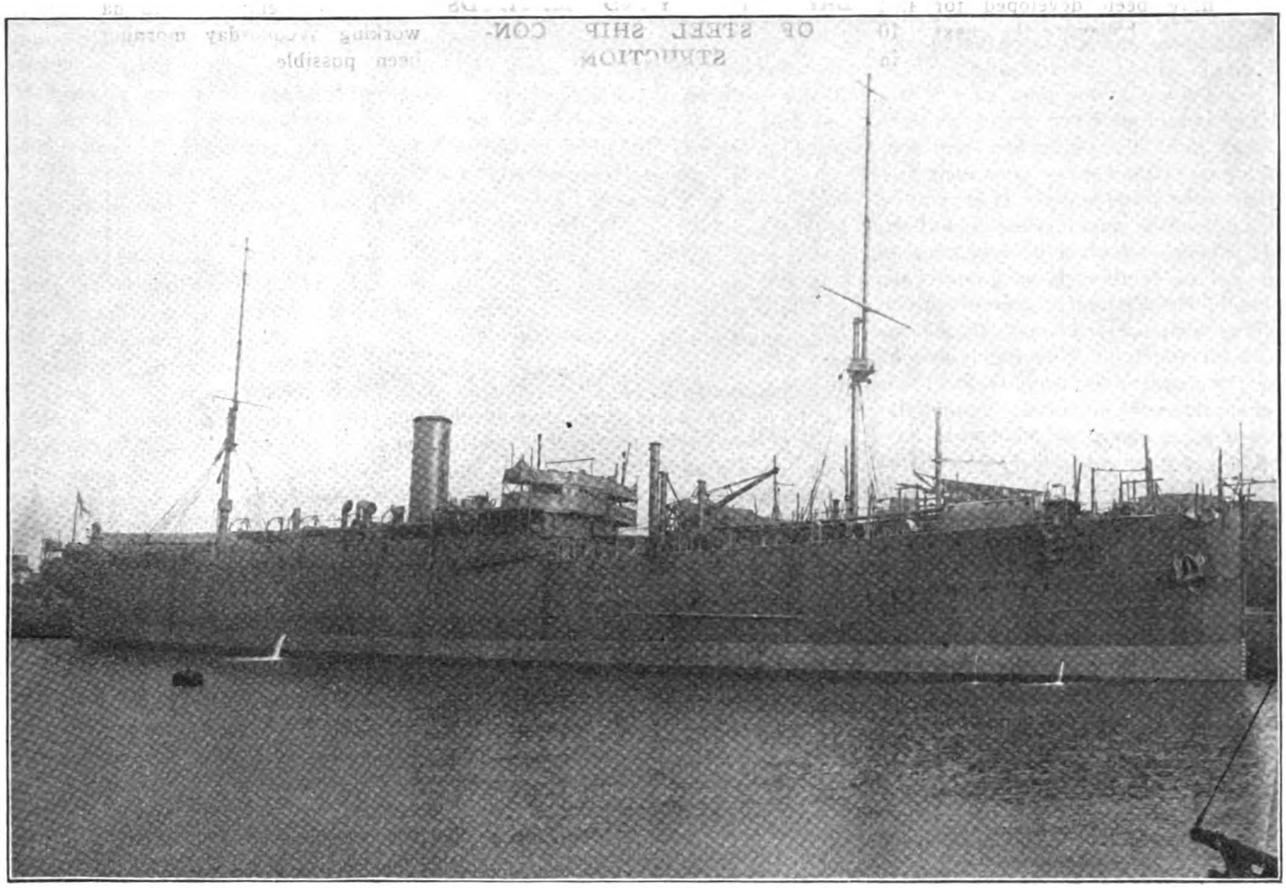
Twenty-six of the newest and up-to-date tools are installed in the punch shop enabling them to put out 80 tons of material for erecting on the ship a day.

The mold loft is located over the punch shop, of the same size and is the most improved and up-to-date mold loft in this country.

The smith shop is 60 x 140 feet and up-to-date. The angle and plate furnaces have underground tanks set in cement with storage capacity of 20,000 gallons of fuel oil.

The slip on the east side of the yard is capable of wintering three modern size ships. They have 2,000 ft. of dock with substantial mooring piles incased in cement and an air line running around the dock frontage to enable them to secure air in making repairs in any part of the yard.

The sewerage system consists of 440 ft. of 10 inch, 250 feet of 8 inch, 1,715 ft. of 6 inch, 425 ft. of 4 inch sewer pipe, making a total of 3,030 ft. with connections, down spouts and closets; steel towers with overhead steam, water and air lines so that steam, water and air is distributed to all parts of the yard where steam, air



BRITISH ADMIRALTY REPAIR SHIP CYCLOPS.

and hot water heating is required.

Test pumps are installed in each pump house so water can be furnished to test boilers and feed boilers while ships are being repaired in the dry dock.

There is a hand crane at the head of the slip dock to facilitate the hoisting material on bow repairs.

Grading and railroad track from the main line to the shear dock are completed enabling them to switch boilers and engines under the 60-ton shears and pick them off from a car and land them on board of a vessel.

They have a winter mooring at the ship yard of 22 vessels aggregating 84,000 tons.

The Toledo Ship Building Co. is to be congratulated on the commencement of its third year.

It has a modern yard substantially built, with the good will of the vessel owning interests in general and a profitable winter's business to start with.

Capt. Robert Murray will command the steamer Rochester of the Western Transit Co.'s fleet this year.

A WONDERFUL FLOATING DOCK YARD.

The fitting out of His Majesty's ship Cyclops by Sir James Laing & Son, ship builders, Sunderland, has now been completed, and from particulars that can be obtained she is destined to be one of the most novel craft afloat. The secrets of this ship have been so jealously guarded that even the workmen of the builders have been conducted to the departments in which their work lies, and have not been allowed to communicate with any other part of the ship. Even at meal times if the workmen had brought their food with them they had to go ashore to eat it, all this in accordance with the carrying out of the official secrets act. Nevertheless a few privileged persons have been allowed to see through the ship, and they all speak with wonder of what they have seen. The works on board the ship are equivalent to those of a dock yard employing 300 workmen, that being the number of artificers she will carry in addition to the crew to work the ship. H. M. S. Cyclops may be described as the most complete repair ship or floating dock yard in the world, and is the outcome of an experiment made some time ago when an old cruiser was converted into a repair ship at Portsmouth and named Vulcan. The Cyclops is a vessel of 11,000 tons and her dimensions are: Length, 460 ft.; breadth, 55 ft.; and depth, 40 ft. Ship yard and engineering machinery are fitted up in her interior. As a matter of fact there is not a machine to be found in a ship yard or marine engine works that is not represented in the hold of the Cyclops. On her lowest deck is a fully equipped foundry and forge with cupolas where damaged parts of machinery can be replaced by new castings. Then there are carpenters', blacksmiths' and armorers' shops, fully equipped, fitting works, coppersmiths' and electricians' departments. On a higher deck is a boiler shop where boiler and ship plates can be dealt with, punching and shearing machines being there just as in a land ship yard. A powerful crane travels all around the ship to lift repairs from the holds, and on or off the warship that has come up for repairs. An electricity generating station is also included in the Cyclops' equipment, for by this power all the machines and cranes are worked. Ice making plant is also carried, and as a contrast refrigerating is also represented, while on another deck is a gigantic set of condensers capable of supplying a whole fleet with

fresh water. A few examples of the capabilities of the works on board may be given. If she is accompanying a fleet at sea and one of the ships loses a propeller, instead of being towed home to a dock yard, the commander will simply signal to the Cyclops for a new propeller to be made and the order will be executed. The same applies to anchors, and in this connection it is amusing to see a huge anchor hanging over the bows of the Cyclops in correct position which on close examination proves to be made of wood. This is simply one of the complete sets of templets which the vessel carries for all sorts of castings required in the navy. In addition to having any portion of machinery renewed or repaired, vessels of the fleet, in case of the refrigerating plant breaking down, can be supplied with unlimited quantities of ice from the Cyclops, made on board, and in case of accidents to their condensing plant supply them with fresh water. The vessel has taken two years to fit out since she was launched. She has a speed of about 16 knots an hour, and she is believed to be the only specially-built craft of her kind in the world.

LUBRICATION.

There is probably no factor that has a more direct bearing on the cost of manufacture than the lubricating of machinery and yet it is doubtful if there is another item connected with the operation of the average plant less understood by owners, their managers and superintendents in charge.

The mechanical installation is of the highest known efficiency, everything is done in the equipment of a plant to secure economy in its operation. After all this is done, frequently a long step is taken in the opposite direction by the use of a lubricant unsuited to the existing conditions; the office of a lubricant is not merely to secure quiet running of engines and machinery with temperatures of the bearings not alarmingly high but primarily to reduce friction and wear to a minimum, and a lubricant that will do this is the best to use, no matter what the price may be.

Messrs. Adam Cook's Sons, 313 West street, New York City, the only makers of "Albany Grease," say in urging the special merit of that lubricant, that few realize the great loss in power due to the friction of wearing parts; it may probably be fairly estimated that one-half the power expended in the average case is wasted on lost work, being consumed in overcoming the friction of lubricated surfaces, and a reduction of 50 per cent in the work lost by friction has often been secured by a change of lubricants. Among the expenses chargeable to waste power, due to inferior lubrication, may be included: (1) The cost of power produced in excess of that really required; (2) wear and tear of machinery, which is constantly doing more work than should be required of it.

It is more difficult to do more than point out the danger due to the use of inferior lubricants, there being so many substitutes placed on the market with a schedule of laboratory tests which are useless and misleading to anyone other than a manufacturer of lubricants, who makes use of them merely as a means of insuring uniformity in his manufactured products and not as a measure whereby to judge their practical value. As a general guide in purchasing a lubricant it might be said that a grease which is uniform in quality, every part of which is a lubricant and will not gum or leave a sediment is of the greater value.

From many careful experiments and tests made it is certain that a grease such as "Albany Grease," contains all the elements for perfect lubrication and is the best and most economical for any bearing, for the reason that is a purely animal grease, free from all destructive acids, will lubricate and preserve the bearings of machinery better than any of the so-called mineral greases on the market today, as it has done for nearly forty years. Having comparatively low melting points for the different consistencies it will more readily melt, and thus lubricate, cool and preserve a bearing which from carelessness, inattention or the improper placing or setting of cups would otherwise burn or cut out and be practically destroyed by the use of mineral greases with high melting points. Take, for instances, a mineral grease with a melting point of 300 degrees (and most of those on the market range in that neighborhood, with some running as high as 600 degrees) and place it in open box bearing caps; the usual result is that the bearing will get hot almost to the melting point of the grease before it will flow over the bearing and lubricate it. This is getting pretty close to the danger point for babbitted bearings and if the heating is long continued will destroy them. Besides if the bearing should be neglected for a short time and not supplied with grease, a burned out bearing or a fire will be the inevitable result. Under the same circumstances, No. XXX Albany Grease, which is of the hardest consistency made, with the highest melting point, 175 degrees, would melt and flow over the bearings, lubricating and cooling it, on account of its peculiar properties, long before the heat of the bearing had reached the danger point.

Mineral greases, furthermore, are injurious to the metals forming the bearing and leave upon the bearings deposits of such substances as gum, lime, etc., which extra thickness and resistance causes wear and tear of the metals and means more retardation and consequently more driving power.

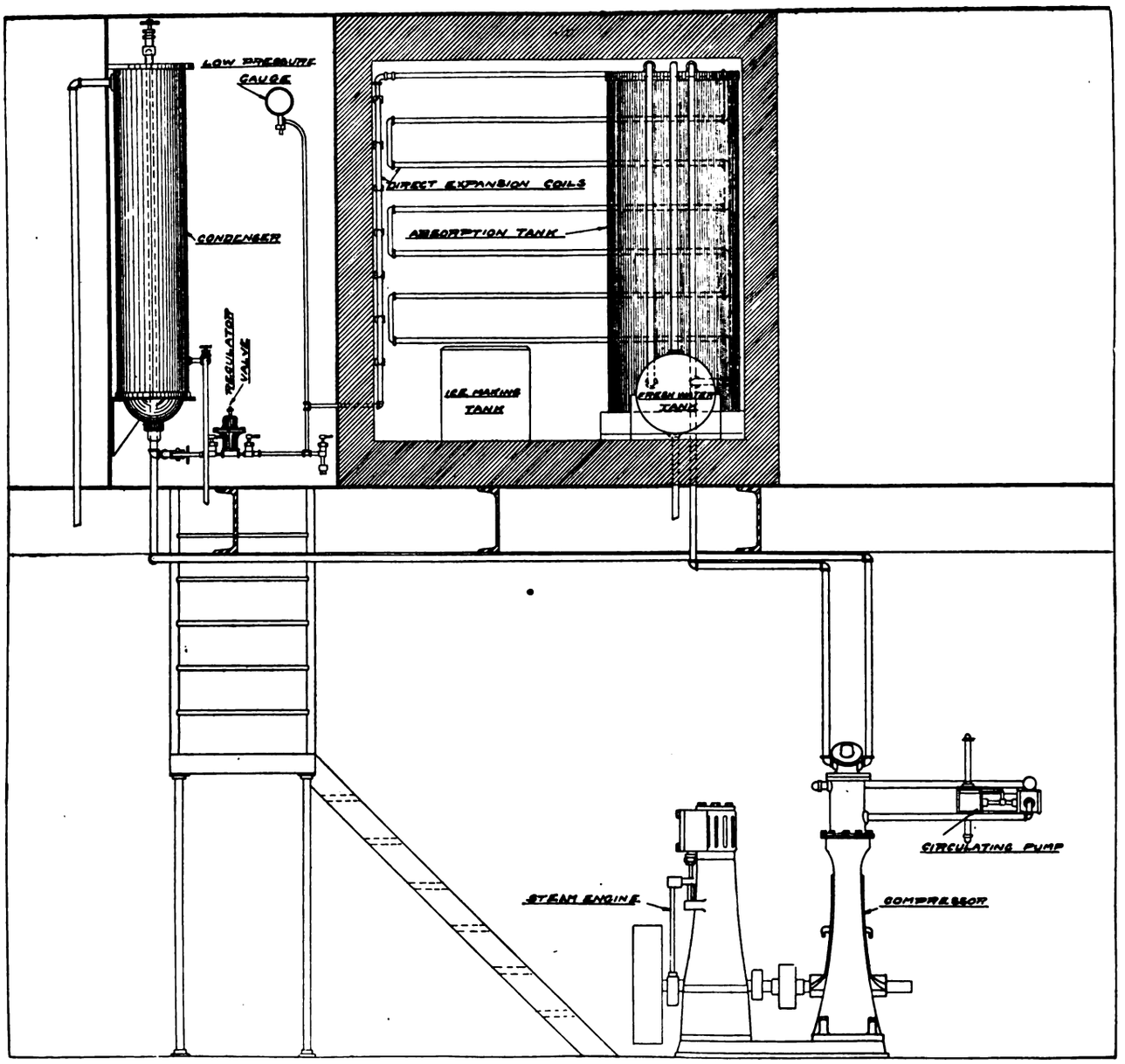
There is record of many instances where, as a result of using lubricants of such limited endurance, accidents of a serious nature have occurred, necessarily causing shut down, just at the time when the operation of a plant to its fullest capacity was imperative.

REFRIGERATING MACHINES ON BOARD LAKE VESSELS.

After years of experimentation artificial refrigerating plants on board modern lake vessels are pronounced a success. They are an improvement over the use of ice in cost, convenience, and in the efficiency of the temperature secured. They effectively do away with the nuisance of handling and caring for the ice, which otherwise would have to be used on trips and also render possible colder and dryer temperatures, a superior sanitation, and a consequent better preservation of merchandise.

Refrigeration at any desired degree is available at all times at a minimum of expense after the plant is once installed, because labor, power, and other incidentals necessary for the operation of such a plant on land are always in existence on shipboard.

The refrigerating machines built by the United Machine Co., 508-510 Howard street, Detroit, Mich., are particularly adapted to vessel use. They are slow speed, self-oiling and enclosed type, but by removal of the cover plates all working parts are easily accessible. Power is supplied by an automatically governed and oiled engine specially designed for the purpose, costing practically nothing to operate, because an amount of steam approximating a leak from the boiler is sufficient to run it. The machine connected with engine occupies 3 1/3 ft. by 1 5 6 ft. space, standing 4 5 6 ft. high. It may be placed in any convenient part of the engine room, and owing to its automatic construction, it is no extra tax upon the time of the engineer or his assistants.



DESIGN OF REFRIGERATING PLANT FOR LAKE STEAMERS, SHOWING GENERAL ARRANGEMENT OF TANKS AND PIPE LINES.

By this process the need for large quantities of ice on ship board is entirely eliminated. However, a device is supplied by which a sufficient amount of ice can be made for daily table use.

A tank containing 30 or 40 gallons of water is kept constantly cold for drinking purposes and it may be piped to the galley, engine room and other quarters of the boat.

As is well known many of the better class of freighters, now on the lakes, are provided with sumptuous accommodations forward for the entertainment of owners and guests. Therefore, a freighter fitted out with all modern devices for the added comfort and convenience of guests, as well as crew, is not complete without a refrigerating plant, which is far more cleanly than refrigerator box can ever be. The accompanying diagram shows to advantage an installation of which there are two in use on the steamer Wilpen.

Richard A. Cottrell of Marine City has placed a libel of $226.75 on the little steamer Chauncey Hurlbut. Service has been made on the boat in its winter quarters at Detroit. There are intervening libels which bring the total claims to $741.10. The steamer Samoa has also been libeled for $1,294.49. Both vessels are owned by Teagan Bros. of Detroit.

STEAMSHIP COEFFICIENTS.

"Steamship Coefficients" is the title of a new book by Charles F. A. Fyfe. It is of pocket-book size and contains the dimensions and performances of nearly 1,000 vessels all reduced to 100-foot models and 80 progressive trials of ship and models with notes of Froud's law of comparison. skin friction correction and engine efficiency.

The data collected has been taken principally from the papers of the most eminent naval officers who have contributed towards the improvement of sound methods of comparing steamship performances. The book is a distinct addition to the literature upon this subject. It sells at $4 and can be had from the MARINE REVIEW.

ATLANTIC COAST GOSSIP.

Office of the MARINE REVIEW,
Room 1005, No. 90 West St.,
New York City.

A dense fog which overhung New York on Monday was responsible for several hours of a complete tie-up of trans-Atlantic and coastwise shipping in the upper and lower bays. Several minor marine accidents were reported.

Seven and a half million gallons of petroleum were shipped from Philadelphia last week, all of which was carried by bulk oil steamers. Petroleum shipments still show a gradual increase and tank carriers are being sought after by oil exporters. The new steamship Oklahoma, launched at Camden last Saturday, for the Texas oil trade, has a carrying capacity of 2,000,000 gallons. She was built for the J. M. Guffy Petroleum Co., and will ply between Port Arthur and Philadelphia.

To illustrate the grounding of an incoming liner, last Monday, some of New York's evening papers had drawn at random from the shipping stock pot. The results showed the vessel with several different kinds and numbers of masts, hulls and funnels. However, as they all had funnels, it might have been worse.

The tug Edgar F. Luckenbach, which was sunk off the Battery, New York, by the Clyde steamer Pawnee on the night of Jan. 27, was raised last Saturday.

Plans for a new steamship line between Philadelphia and New Orleans were laid before the Merchants' and Travelers' Association recently. The project, which is one that has long been agitated by the commercial interests of Philadelphia, is in the hands of the newly formed Philadelphia, Atlantic and Gulf Transportation Co. The capital stock is to be $1,000,000, of which $500,000 will be preferred and $500,000 common. The company has a Delaware charter.

Three fast and commodious steamships will be placed in service when the line is established, it being the intention of the company to have one sailing each way weekly. It is also proposed to establish a branch service between New Orleans and Galveston.

The four-masted British steel bark Puritan, which stranded near Bellport, L. I., during the gale of Feb. 1, while on her way from Boston to New York in tow, has been floated by the Merritt-Chapman Wrecking Co. The wrecking steamers Relief and I. J. Merritt towed the Puritan to anchorage off Stapleton.

The steamship Roda and schooner Howard B. Peck, which also went ashore in the vicinity, have gone to pieces.

The Hartford and New York Transportation Co. has purchased the property and goodwill of the United States Transportation Co. This company has been the holding company for the New York, New Haven and Hartford Railroad Co., of its steamship business, and has controlled the Joy Line, between New York and Providence, and the Neptune Line, New York, to Fall river. It also controls the Maine Steamship Co., which runs steamers between New York and Portland, Me. The railroad thus consolidates all its steamship business.

A magnificent showing was made by the scout cruiser Chester in her official trials on Feb. 28. Seventeen runs were made over the measured mile, the mean of her highest five runs showing a speed of 25 knots. This is a mile in excess of her contract requirement.

The United States naval collier Caesar has arrived at the New York navy yard where she will be fitted out for the job of transporting the submarine torpedo boats Plunger and Porpoise to Cavite, P. I., where they will form part of the island defenses.

A cablegram from Hamburg announces that Albert Ballin, chairman of the board of directors of the Hamburg-American Line, has received from the German Emperor the Royal Prussian Order of the Crown of the first class, which confers on the recipient the title of "Excellency."

We pass over the ridiculous and even dishonoring spectacle of a great nation in need of foreign markets but dependent upon foreign ships to carry her sea-borne commerce. Coastwise trade is worth while, it seems, and foreign ships must be kept out. From foreign trade, on the other hand, the Americans must be and are substantially shut out.—*New York Sun.*

The Vessel Owners' and Captains' Association of Philadelphia celebrated its 40th anniversary this week at that port.

Because of the increasing exports to Holland, the Holland-American Line has chartered the British steamship Ponda as an extra boat to load at Philadelphia for Rotterdam. The Ponda is now on her way from South Africa, bound for Boston.

Some remarkable steamship handling was witnessed in the Hudson river last Friday, when the Mauretania, the biggest and fastest passenger steamer in the world, was swung into her berth and made fast in the short space of 10 minutes.

After being for 10 hours hard and fast on Jones' beach, Long Island, on Monday, the steamer Coamo of the New York and Porto Rico Steamship Co., was floated by the rising tide and the aid of the wrecking tug, I. J. Merritt. The Coamo went ashore in the dense fog of Monday, while bound inward from Porto Rico, and was floated none the worse of her temporary disablement.

The Danish steamer Secalia, which arrived at Philadelphia on her first voyage to the United States, experienced extremely heavy and cold weather on the voyage, two of the crew being swept overboard and lost.

The Pennsylvania pilots have agreed to take four or five apprentices to learn the business and have so signified to the commissioners of navigation. It is some considerable time since an apprentice has been given this opportunity.

The commissioners of navigation have decided that all pilots working under the Pennsylvania laws must be bona fide residents of this state.

There was launched at Ramage & Ferguson's yard at Leith, Scotland, this week a twin-screw steam yacht for Morton F. Plant, of Groton, Conn., member of the New York and Hartford yacht clubs. The yacht was named Iolande and is the third largest private yacht in the world. She is 305 ft. over all, 258 ft. keel, 37 ft. 6 in. beam and 23 ft. deep. Her machinery consists of two sets of four-cyclinder triple-expansion engines, 19, 31, 31 and 35 in. diameter by 27 in. stroke, supplied with steam from two cylindrical and two water-tube boilers.

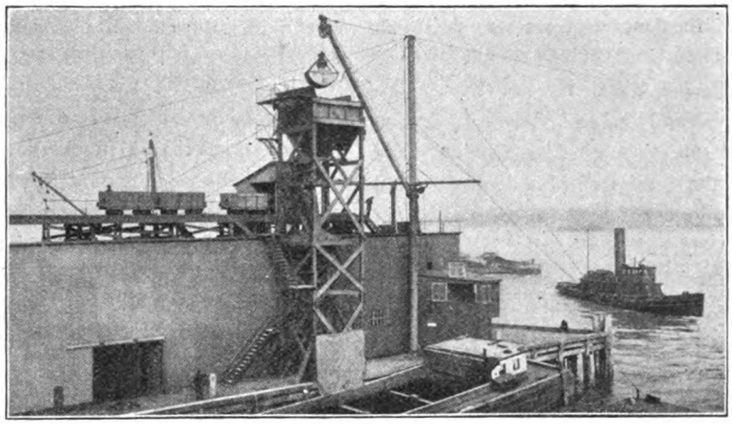
George Uhler, supervising inspector general of the steamboat inspection service, has recommended that steamship inspection offices be established at Honolulu and San Juan.

COAL-HANDLING PLANTS AND EQUIPMENT.

The many types of coal-handling machinery in operation along the water fronts of our seaports and rivers are the direct result of the endeavor to cope with the ever-increasing coal traffic by water, and show considerable ingenuity exercised in overcoming the many obstacles met with under various conditions. The construction of this special type of machinery is a branch of engineering unique in itself, the conditions under which the work of unloading the colliers and barges, the location of the plant, manner of handling the coal and other features, governing the type of plant best adapted to the requirements.

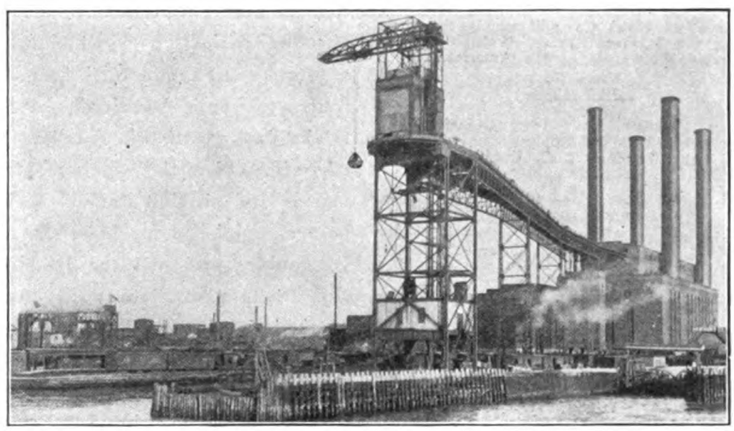
Along the banks of western and southern rivers it has been found necessary, owing to the rise and fall of the river, to place stiff-leg derricks and similar bucket-operating machinery upon concrete piers, the tops of which are well above the high water mark. The coal bridge, in all manner of designs, is a common sight wherever quick handling of coal by bucket is necessary, as is the Boston steeple tower, used principally in the east, the locomotive crane, mast and gaff and the innumerable types of derricks.

New York harbor is especially rich in equipment of this type, one of the most notable plants being the immense coal hoisting tower at the Long Island City power house of the Pennsylvania railroad, seen in the accompanying illustration. It is situated directly on the river front, and is the object of much conjecture on the part of the uninitiated. It is not only on account of its peculiar construction that the tower is noteworthy, it being the highest hoisting tower in the world. One hundred and seventy feet is the distance between the boom and the water at high tide. This machine on test handled 90 tons of coal per hour for five consecutive hours, using a Hayward clam-shell bucket of 2-cu.-yd. capacity, the performance being remarkable owing to the great length of hoist.

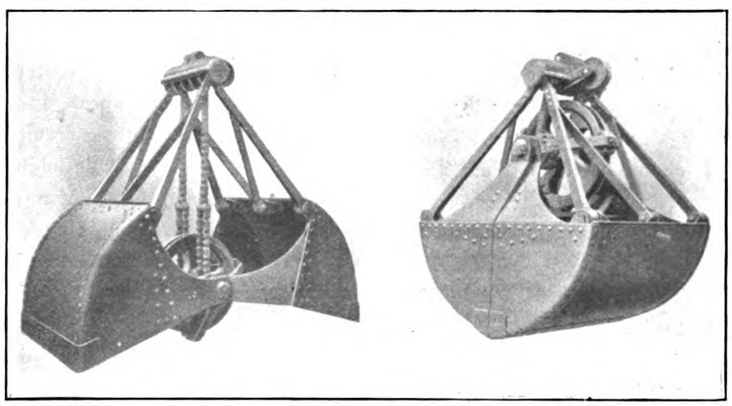


PLANT HANDLING 50 TONS OF COAL PER HOUR.

The mast and gaff coal-handling plant in our other illustration is a type much in favor on account of its simplicity of operation combined with great capacity. It is equipped with a double-cylinder double-drum engine, and operates a 1½-cu.-yd. clam-shell bucket from a 38-ft. radius boom attached to the mast. The average capacity of this machine per day of 10 hours is 500 tons from barge to hopper. It is owned by the New York Mutual Gas Light Co., and was built and designed by the Hayward Co., of New York, builders of all kinds of coal and ore handling machinery, and makers of the well-known Hayward clam-shell and orange-peel buckets.



NINETY TONS PER HOUR—FROM BOOM TO BARGE 170 FT.



CLAM-SHELL BUCKET USED IN COAL HANDLING.

The Wisconsin Engine Co., Corliss, Wis., manufacturers of Corliss steam engines, gas engines, pumping engines, air and gas compressors, have established a branch office in Atlanta, Ga., with offices and rooms in the Candler building. Julius M. Dashiell has been appointed sales manager.

The annual conference between the officials of the Great Lakes Towing Co. and the licensed tugmen and the tug firemen will be held at the office of the company on March 16.

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March 5, 1908.

OCEAN MAIL BILL.

Speaking in favor of the passage of the ocean mail bill in the senate, Senator Gallinger reviewed conditions under which the merchant marine of this country is operating, and cited many advantages that he believed will accrue to the commercial interests of the United States if better mail facilities to South American and other ports are established. He said:

"The bill raises no new issue, introduces no new principle. It leaves existing and prosperous steamship services exactly as they are now, and, without changing one iota the tried and approved methods of the present law, increases the compensation on routes which 16 years of experience have conclusively proved to be inadequate—the long, costly, and important routes to South America and the Orient, the routes where our lack of steamship service is severest, and our need of such service most imperative.

"Only eight of 15 ships that were plying across the Pacific ocean last March are left. Since the shipping bill of the last congress was defeated, almost one-half of our feeble American Pacific naval reserve has disappeared, and when Admiral Evans steers up through the Golden Gate from the Straits of Magellan, we shall have the grotesque disproportion in the Pacific of two battleships to every commercial vessel engaged in foreign trade—a sight which has never yet been seen beneath the sun. And unless the new shipping bill is speedily passed, we shall see an even more grotesque disproportion than that—16 battleships and not one commercial steamer in the Pacific away from the ports of the United States. For the remnant of our merchant marine in that mighty ocean is now facing the absolute extinction which long since overtook our commercial fleet on the routes to South America."

The passage of this bill, he predicted, will revive the waning American marine and all that the bill seeks can be accomplpished for $4,000,000 a year. It would strengthen the Pacific lines and create new lines to the southern hemisphere. It would, he said, promptly establish a line from the Atlantic coast to Brazil, and another to Argentina, a line from the South Atlantic or Gulf coast to South America and similar communication to the Pacific ocean.

The proposed payment for these advantages is about half the amount England and France now pay for their steamship service and less than is paid by Japan. Last year the United States made a profit of $3,600,000 on its carriage of foreign mail, and he hoped to have at least that amount devoted to building up the foreign mail service. He continued:

"In view of these facts need we wonder that in spite of the Monroe doctrine we are being quietly shouldered out of the South American republics by other peoples whose governments understand the intimate relations between ships and trade? Great Britain, France, Germany, Italy, Spain, have long had their own steamship lines to South American markets. Japan had no sooner closed her victorious war with Russia than she subsidized into existence a steamship line across the Pacific to Peru and Chili, and our consuls note that this is about to be extended to Argentina and Brazil. What a mockery of fate it is that the people of a hermit nation, which the United States 60 years ago first opened and introduced to the modern world, should now be able to boast better, more regular, and more direct shipping facilities of their own to South America than are provided for the manufacturers and merchants of the United States.

"The most smarting and humiliating episode of the entire year is the revelation which the Pacific cruise of the great battleship fleet is affording, that our merchant marine is now shrunk to such a skeleton that it does not contain enough ocean-going steam colliers to provide the indispensable fuel for our battleships on their voyage from the American port of Hampton Roads to the American port of San Francisco."

More than 20 new and powerful steamships available as auxiliaries of war would be built by the influence of the bill if passed, he said. The proposed legislation would also help to break up the shipping trust in South America.

VAN SCHAICK'S SENTENCE.

Capt. Wm. R. Van Schaick, master of the steamer General Slocum, which burned in Long Island sound with a loss of over 1,000 lives, was taken to Sing Sing last week to serve a 10 years' sentence. He was sentenced on Jan. 27, 1906, but appeal was taken to the United States circuit court which has now sustained judgment of the lower court. Capt. Van Schaick is an old man and in all probability will not outlive his sentence. He was accompanied to prison by his aged wife. The American Masters and Mates Association is petitioning the president to pardon the captain. The Slocum disaster was the most terrible in the history of steam navigation

and there doubtless was appalling negligence exhibited on board the steamer. Nevertheless, while the mind in passing upon the evidence recognizes the absolute justice of the sentence, still in equity there seems something lacking. The incarceration of this old man as a lesson is useless for the faults in the Slocum have already been remedied in common practice. The real culprits occupied higher positions than Van Schaick.

FREIGHT SITUATION.

There is practically nothing stirring in lake circles at present. It is generally conceded that the year 1908 will be a very quiet one. No estimate upon the ore movement has been placed higher than 30,000,000 tons, which is the outside figure. Even if 30,000,000 tons are moved it will mean two months less work for the ships than last year's movement. If the fleet does not start out until June 1 it will have no difficulty whatever in moving 30,000,000 tons. No disposition has been manifested on the part of leading shippers to start their own fleets at the opening of the season. It is quite clear that no such movement will be made though by doing so the shippers could probably carry in their own vessels nearly all the ore that they require to bring down. Ever since the advent of the Steel Corporation upon the lakes there has been a disposition to be absolutely fair. There has been no effort made to break down a weak market at any time. Such business as will offer during the year will be as fairly distributed amog vessel owners as possible. By such broad-minded policy the good will of everyone is earned. The lake trade is not of a day or of a year. It is understood that some of the leading shippers may put certain of their boats in ordinary if the season promises less than present expectations.

The movement of ore from dock to furnaces has improved a little during the past two weeks, but is nowhere near the normal movement for this time of year.

Indications are that the coal movement this year will be better than ever before. Rates have already been established upon last year's basis and as soon as a general start is made many of the larger class of carriers which do not usually carry coal will enter the trade for a trip or two at least.

PIG IRON SITUATION.

A slight but steady improvement in nearly all lines of the iron trade has been noted the last week. March 1 brought out to the surprise of some grumblers the fact that the total transactions for February show a comfortable increase over January. The monthly blast furnace statistics show a production of 1,233,074 tons in February, compared with 1,081,813 in January. The stacks making iron for the general market decreased their production by 44,000 tons and at the same time the output of metal used for making steel increased by 200,000 tons, while there were 138 furnaces in blast on the last day of January, and February closed with 152 stacks in operation.

The wire market is showing probably the most prosperity of any branch of the iron trade at the present time. The principal producer has about 80 per cent of its capacity in operation. The increase of orders from railroads has also been a favorable development. Orders for steel rails during the past week amounted to 15,000 tons, and in Chicago track supplies are being bought liberally, including 3,000 tons of spikes. Structural material shows an improved demand, but some erectors are quoting very low prices, particularly in Cleveland. The pig iron market is dull, and the agreed prices for northern iron seem to be maintained. Southern quotations show much irregularity, it being possible to purchase in some cities at $12.50 Birmingham, but generally $13 Birmingham seems to be the minimum.

The coke market is quiet, practically little business being done.

SUMMARY OF ICE CONDITIONS.

The reports from the regular and display stations of the weather bureau indicate that there is not quite as much ice in lakes as reported last season. Over extreme western Superior the ice fields extend beyond vision. No ice fields are reported off the Apostle islands. To the east and north of Marquette the ice fields are small and broken up; over the eastern portion the fields are extensive and moving with the wind. Reports from Green Bay indicate that the ice is solid. Along the west and south shores of Michigan the fields are small and broken up. From Traverse bay northward to the straits the ice appears firm. At the straits the ice averages 20 in.; it is covered with snow and is solid from Lake Michigan to Bois Blanc island. In Huron the ice fields are not extensive over the northern portion. From Saginaw bay south the field extends beyond vision and is not moving. St. Clair river is open to Stag island. Some open water is reported in Lake St. Clair. The ice in the Detroit river extends from Third street south to the mouth. In Lake Erie the ice fields along the south shore extend beyond vision, but have been moving with the wind. In Ontario some fields are reported over the extreme western and eastern portions.

In comparison with same period last season there is not quite as much ice in the lakes. The ice in the harbors varies.

CAPT. GUNDERSON RETIRES.

Capt. Harry Gunderson, who has sailed for practically 50 years, has retired to enter business in Chicago. He has been with the Kinsman Transit Co. for several years, his latest command being the Henry Steinbrenner.

The appointments of masters of the Kinsman Transit Co. are as follows:

Captain.	Steamer.
G. D. Tulian	Henry Steinbrenner
Joseph Lampoh	M. Andrews
M. Cummings	Philip Minch
Albert Loher	Anna C. Minch

OBITUARY.

Capt. Alfred Trente, born at St. Ambroise, Canada, died at Sault Ste. Marie last week. He was one of the pioneers of the Lake Superior country.

Charles W. Payne, agent of the Anchor Line at Erie, died very suddenly at his home this week. He had just entered the dining room when he was seized with heart failure and succumbed immediately. He had been with the Anchor Line since 1872 and was one of the best known line officials on the lakes. He had complete charge of the company's elevators and docks at Erie.

Contracts will be let within a short time by the Michigan Alkali Co. of Detroit for building 30,000 ft. of dockage at its works No. 2, Ford Village, near Wyandotte, including a frontage of about 1,800 ft. along the Detroit river. This is part of the company's plan of transporting stone from its quarries at Alpena by water. Contract for a steamer has already been given to the Great Lakes Engineering Works.

The plant of the Milwaukee Dry Dock Co. is crowded with work. The steamer E. F. Holmes is on the stocks in the south yard for a renewal of several plates. Minor repairs have latterly been made in the steamers Christopher, R. W. England and W. H. Gratwick.

FOR THE LAKE MARINE

In this department hereafter will be found everything of current interest pertaining to Lake Navigation. Masters are advised to consult it weekly for information of interest to them; and owners are invited to use it freely for the promulgation of all announcements of a general nature. The Marine Review will be placed aboard every vessel having membership in the Lake Carriers' Association, representing a registered tonnage of nearly 2,000,000 tons, and can, therefore, be depended upon as a reliable courier to the entire fleet. It will reach every vessel in active service weekly. It is the intention to make this department complete so that at the end of the year it will be an authentic record which should prove of permanent and increasing value to owners and masters alike.

Francis C. Shenehon of the United States Lake Survey addressed the masters of the Pittsburgh Steamship Co. at their annual meeting at the Hollenden, Cleveland, in January last on the work of the Lake Survey. He convinced the masters that shoals are relative things and that new ones are bound to be discovered with each successive stage of deepened draught in navigation. His address was clear and impressive. He said:

F. C. SHENEHON'S ADDRESS.

"Gentlemen:—I am glad to be present at this conference for three reasons: First, you know a good many things I want to find out; second, I want to make you better acquainted with the Lake Survey, with what we are doing and what we hope to do; third, I want to tell you some things you can do to help us and at the same time to help yourselves.

"Now, the Lake Survey, as you are well aware, is not a new institution. It began its work back in the middle of the last century, and ever since that time it has existed. A part of the time it has *barely* existed. For a number of years, it received not a dollar for surveys, only a few thousand dollars a year to correct and issue charts.

"Begun in a small way, the earlier large activity of the Lake Survey preceded the War of the Rebellion, and continued through that war, and to the late seventies; and the basis of the navigator's charts you have today was worked out in those earlier years. Then there was a lapse of nearly twenty years,—from 1880 on,—when little survey work was done. In 1900—eight years ago—the renewed activity of the Lake Survey began, and work on a large scale should go on for ten or twelve years yet to come.

"Rather a remarkable relation appears between surveys on the Lakes, and the building of ship locks at the Sault. Even the old State Lock—some of you remember it—built in 1855 and torn out 18 years ago to make room for the present Poe Lock,—even this state lock stimulated surveys on the Lakes; then the building of the Lock of 1881,—the Weitzel Lock,—pushed survey work; the big Poe Lock next accelerated surveys; and now the projected new lock at the Sault makes extensive survey work again desirable.

"There was 10 ft. of water in the Old State Lock, 15½ ft. in the Weitzel Lock, 20 ft. in the Poe Lock, and there will be 24½ ft. in the projected new lock,—an increase of 14½ ft. of draught in little more than half a century.

"Now, there is a very simple reason why lock construction and survey work on the lakes go hand-in-hand. It is this; because deep draught through a lock and through a dredged cut is of little value unless the safe tracks in the natural channels and in the open-lake areas are laid out and assured by adequate surveys. And I want to say right here, that when you get 22 ft. navigation and 24 ft. navigation, you are going to find some shoals and some old wrecks by piling up on them,—unless we find them by surveys first. And we can only keep ahead of you in this business by working on a large scale.

"The Lake Survey has a fleet of five survey steamers, distributes nearly 20,000 charts a year, gives you a big yearly bulletin, sends you supplements every month, and gives immediate special notices in all the lake papers of new shoals, wrecks, derelicts, water levels, and predictions of rise or fall of the lakes; it is guarding the Lake levels, and looking into the encroachments made at Chicago and at Niagara Falls; it is studying the Lakes with a view of raising them to give better draughts,—draughts that are just as good in December as in July; and it is giving you the magnetic laws to guide your compass corrections.

"Now, the Lake Survey is under the War Department with the big Secretary Taft at its head; and in the War Department the Lake Survey comes under the Corps of Engineers with General MacKenzie as Chief of Engineers and Major Keller, who has already addressed you, is chief of the Lake Survey.

"But, Major Keller is not chief of the Lake Survey only, he is lighthouse engineer of the 11th district as well, and at the present time is in charge of the engineer office at Grand Rapids, and is a member of the board of engineers engaged in straightening out the tangle at the Sault to get the new lock going.

"The Lake Survey does practically all of the survey and chart work for the Lakes. We have even invaded Canadian water where necessary. At the present time, however, the Canadian engineers are doing good work along their own side of the Lakes.

"The hydrographic office of the Navy, between 1889 and 1901, made some small surveys on the lakes, but since 1901, practically no surveys have been made; it has compiled and issued some charts of the lakes, but, as a total, these do not exceed four per cent of the charts in use.

"The war department has the complete organization of the Corps of Engineers in charge of all dredge work for deeper channels and harbors, all construction work—breakwaters and ship locks — responsible for the improvements of the right of way which you navigate and for its operation; and all the public works of the United States relating to navigation are in their hands,—including the Panama canal.

"Now, the chain of Great Lakes is a transportation system, just the same as a railroad, and this system, like a railroad, has two parts. One part is the right of way,—the waters you navigate,—and the other is the rolling stock,—the vessels you command. I hope you won't object to my calling your vessels *rolling* stock.

"But, the ownership of this transportation system differs from that of a railroad. A railroad owns the right of way and owns the rolling stock also. On the Lakes, the rolling stock is owned by private or corporate interests, while the right of way, for purposes of navigation, is owned by the government.

"And here is where we come together. You represent the rolling stock, our work is on the right of way. Here is a community of interest. If you build good ships and navigate them skillfully, and the government gives you a clear track, we get cheap transportation, and all of us share in the benefits of cheaper bread, cheaper coal and cheaper steel.

"Now, in this transportation system of the Great Lakes, the United States government holds a controlling interest, because it has the right of way, and I am going to show you how this figures out.

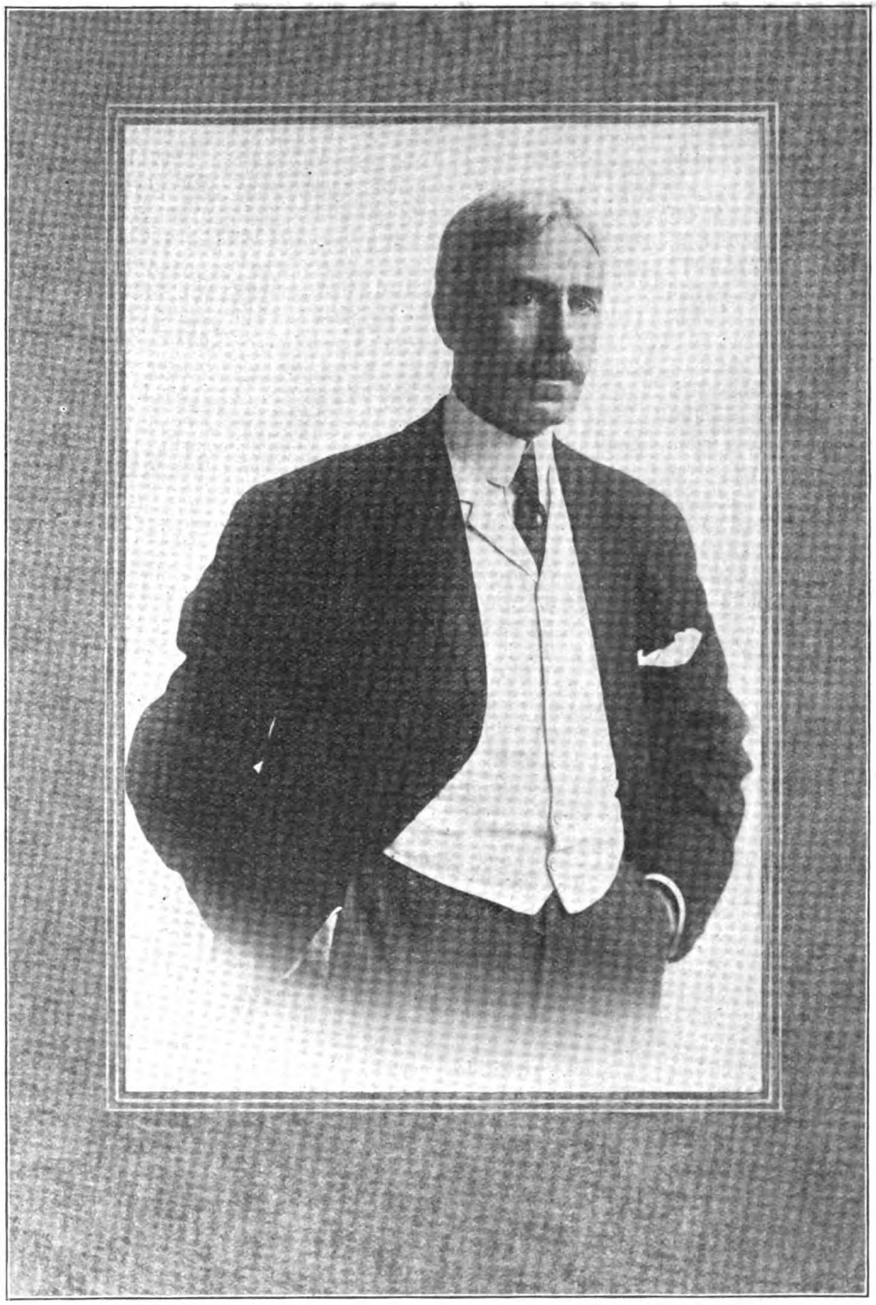
"In 1907, the saving growing out of the lake freight transportation was, roundly, $112,000,000. As the government can borrow money at 2 per cent it could afford to pay for the Lakes, fifty times $112,000,000, or $5,600,000,000, and make an advantageous *deal* out of it in the side profits arising from the passenger traffic, the fisheries, water powers, subsidiary uses and increased valuation. So,

that is what it is worth, — over five and a half billion dollars!

"As about 62 square miles of water surface lie on the American side of the boundary, each square mile is worth $90,000, and each acre is worth $140, — with a rapidly growing valuation.

"Vessel interests are credited with about $150,000,000 in rolling stock and terminals. So the government's interest compared to that of the vessels is over 37 to 1. But if you got at the value of the holdings of private and corporate interests by capitalization of earnings it might reduce this ratio to 16 to 1.

"Well, the right of way is so valuable and so large that it is worthy of an efficient organization of civil engineers to improve, explore and operate it; and the government's organization working under the Chief of Engineers of the War Department divides the Lakes into seven geographical districts with an officer of the Corps of Engineers at the head of each.



MR. F. C. SHENEHON OF THE LAKE SURVEY.

"Beginning at the east end the first district is under Col. Adams, of Buffalo. The second district is under Col. Townsend, of Cleveland. The third district comes under Col. Davis, of Detroit. The fourth district, as I have said before, is temporarily under Major Keller, with headquarters at Grand Rapids. The fifth district is under Col. Bixby, of Chicago. The sixth is under Major Judson, of Milwaukee, and the seventh district under Major Fitch, of Duluth.

"Now, these seven district engineer officers are engaged mainly in work relating to *rivers and harbors*. Outside of the rivers and harbors, is the vast open lake—the big right of way of the Lakes, with its intricate mesh of vessel tracks, and in these the Lake Survey does its main work. The Lake Survey is the engineering-staff-at-large, dealing with the Lakes as a unit—as a single transportation system. The district engineer is concerned with the needs of his own immediate district. The Lake Survey handles the large questions of Lake levels, and their regulation, all extended surveys, soundings and sweeping, all magnetic surveys for compass variation, all charting of the Lakes, and systematic notices to mariners of changes affecting navigation — in short the things that concern the Lakes, as a *whole* —and are vital in the operation of this great transportation system. But the Lake Survey has nothing to do with dredge work; it does not build locks or canals or remove wrecks. Now, I am going to take up the Lake Survey work in some detail.

"Navigators' charts first. We issue 118 different charts altogether. Of the excellence of the charts you have judged. Most of the charts are now printed in colors. You must understand that back of these charts is an immense amount of work—surveys, drafting and engraving; and when they are ready for sale, we do not charge you for any of the survey work, drafting or engraving, but—as ordained by law—for the paper and printing alone; and the object of this small charge is merely to make charts valuable enough to avoid waste by misuse. We spend, when running to our full capacity, $125,000 a year—and the return from chart sales is about $2,600. The government loses money on every chart it sells you. If we charged $2 for each of the charts we sell now for 15 cents we would still lose money.

"You are well acquainted with the scheme of our charts. First, a general

chart showing the whole Lake system; second, each lake as a whole with the adjacent rivers; third, coast charts showing on a bigger scale parts of the Lakes; fourth, special charts showing critical or complex areas like the Straits, or the Apostle Islands, and the rivers; fifth, large scale harbor charts.

"We want to make these charts better if we can—and having this in view, your President, Mr. Coulby, at Major Keller's instance, sent out a circular letter to you last summer, inviting criticisms and suggestions.

"The consensus of opinion of the masters of the Pittsburgh fleet, was exceedingly complimentary to the charts. But some masters ask us to make certain changes, and these I want to talk over with you.

"Some masters would like charts constructed on Mercator's projection instead of on the polyconic projection used by the Lake Survey. But we think this would be a step backwards. The difficulty in any system of projection is that we must show on a flat sheet of paper what exists on the convex curved surface of the earth. The Mercator projection pretends that the earth, instead of being a spheroid—like a ball—is a cylinder—like a smoke stack. In Mercator's projection the north-and-south lines, the meridians, instead of converging until they meet at the north and south poles, are considered as parallel. By this projection the meridians are just as far apart at the north pole as at the equator. As a matter of fact degree meridians are 69 miles apart at the equator, 46 miles apart in Lake Superior, and meet at the poles. An island a mile long near the pole shows on the Mercator map as large as Cuba, and everything is distorted in this way. You have to use a separate scale for each degree of latitude. There is only one place for Mercator's projection, and that is where you want to show the whole earth, or a hemisphere, on one sheet. The United States is easily shown on the polyconic projection, and the Lake region on our general chart is most properly polyconic. The Coast and Geodetic survey, which makes the navigators' charts for salt water, uses the polyconic projection, and the Lake Survey will have to continue on the polyconic, or drop behind in the procession. The objection to the polyconic is this—that a sailing course between two points, as Southeast Shoal Lightship and Dunkirk, 166 miles, for instance, is a curved line, and we show it straight. This objection is, however, not serious. At the middle of this course a ship is three-quarters of a mile further south than the straight line course shows—and this is an extreme case. Masters should, however, be careful in shaping courses to get their bearings on the compass rose at the middle longitude of the run. If the wrong compass rose is used an error will enter.

"Capt. Regan's suggestion to put more compass roses on our charts is a good one for this reason—and will be adopted. A good many masters want minute divisions on latitude and longitude marginal scales. We will put these on as far as we may.

"It has been suggested that sailing courses be erased from the charts—each master to make his own. However, as examinations for masters and pilots require a knowledge of sailing courses, it seems proper to put on the charts the lines which are shortest, have the best water and are marked by aids to navigation.

"It is well understood that in thick weather masters get out where there is more sea room, and in gales they lean towards the windward shore. But in fair weather the vessel tracks follow certain lines which it seems well to have laid down with course and distance.

"A good many masters want magnetic courses on sailing lines instead of true, but the best suggestion is that of Capt. Chamberlain to give both magnetic and true, one on each side of the line. The true course, which is unchangeable always, should not be superseded; but the magnetic, which changes from year to year, can be revised on the charts as new editions are issued. Even better than this, however, is to put *red* lines of magnetic variation on all charts, the same as those on the general chart of the lakes.

"Capt. Holdridge wants courses set down in degrees as well as points. I hope the day will come when points on the compass will be put aside, with spinning wheels and stage coaches. Our civil engineers, even on shipboard, never use anything else than degrees. Anyone who has once used degrees exclusively would never return to points, any more than a man using dollars, dimes and cents, would go back to pounds, shillings and pence. The correct division of the compass to my mind is into degrees—with zero at the south, 90 degrees west, 180 degrees north, 270 degrees east—ending on south again with 360 degrees. That is what astronomers and civil engineers use. The count is always around in one direction like the hands of a clock.

"Here is the way points and degrees compare. In the full compass there are 360 degrees and only 256 eighth points. A degree is, therefore, nearly half again as fine a division as an eighth of a point. In a run of 100 miles an error of a degree will throw a vessel off 1¾ miles, and an error of an eighth point will throw her off 2¼ miles. It ought to be easy for a wheelsman to steer to a degree, and it is certainly clearer to call a course *58* than southwest by west one-eighth west—and the chance of reading the compass wrong seems less.

"Whenever you observe on the sun, moon or stars you have to use degrees. Whenever you correct for magnetic variation you use degrees. Why use anything else?

"It ought to be clearly understood that a master is doing the same thing a surveyor does. A surveyor runs a compass course and measures it with a chain. A master runs a compass course and measures it with his log. A surveyor plots his course and knows where he is on the earth. A master plots his course and knows where *he* is on the sea or lake. And both depend on the sun, moon and stars. The best surveyors today in our public land surveys do not depend on the magnetic compass when the sun is shining. They use the solar compass, which is an instrument depending on the same principle used in getting the compass error by sun observation. The land surveyor has a proposition a good deal easier than the navigator because the solid earth is under his feet. He is not troubled by currents, or drift from wind, and he is not ordinarily surrounded by a big mass of iron and steel.

"It is because the navigator is handicapped by his metal hull, stacks, boilers, engines and cargo even, and because the influences of these change when his vessel heels over—and when under different magnetic conditions—that it is necessary to get every possible check on his compass, to make sure that these misleading forces are compensated.

"I am told that when the ocean greyhound, the Lusitania, is speeding across the Atlantic, a special officer makes continuous observations on sun, moon and stars whenever they shine.

"On the lakes with so much thick weather a master is tied to his magnetic compass to a large extent, and compass testing ranges must therefore help him as far as possible in checking up.

"The ranges of the Detroit, St. Clair and St. Mary's rivers are good for this, and can be used whenever they are long enough to steady the steamer on them. The Lake Survey expects to issue a table of testing ranges—following the excellent suggestions of Capts. Morse and Sawyer—getting them in the best shape for your use.

"Masters do not like to lost time swinging ship, or leave their main track for special testing ranges, and for this reason special ranges like those established by the hydrographic office in the Straits and at Detour are of less value than the regular ranges.

"The Lake Survey charts are con-

structed so accurately that you can head on one lighthouse, with a second ranging over your stern, and test your compass by transferring to the compass rose, the line on the chart drawn between them. And you can test your log by the scaled distance between the lights.

"Now, when you have found that the compass reading differs from the true bearing by 10 degrees, if you know the *magnetic variation* is 6 degrees, the remaining 4 degrees is the uncompensated compass error or deviation on that course.

"But you cannot know your compass error until the Lake Survey tells you the *magnetic variation.* We have done a good deal of work on this already, but we need to do much more. We will work, not alone on shore in our future magnetic observations, but we will do what you masters are asking, make observations on the turning points out in the lake. We expect to build a scow or raft without any iron in her and observe all over the open Lakes.

"Some masters want a scale of nautical miles on the charts. My own experience is that more than one scale of miles is bad. You sometimes use the nautical miles scale when you intend to use the statute miles scale, and the reverse. It results in errors. The need of the nautical mile does not to my mind exist on the Lakes strong enough to warrant introducing the confusion of too many scales. We do, however, make the concession of putting a scale of nautical miles on the general chart of the Lakes.

"During the past year 19,800 charts were issued, and 16,640 were sold. The Lake Survey issues over 96 per cent of the charts of the Lakes. It is, I believe, well known that Lake Survey charts are on sale at Buffalo, at the Sault, and at our own office in Detroit.

"Now, in regard to bulletins. The chief change in our information service asked by masters was to get notices into their hands more quickly.

"The prior practice of the Survey was to give you a year book, a bulletin, in the spring, and monthly supplements during the season of navigation, and some special notices through the press. This season, however, we anticipated the request for more rapid spread of news by sending out special, immediate notices to 106 newspapers and marine publications all over the Lakes, and to many vessel owners besides.

"The news gathering strength of the Lake Survey comes from the fact that it is the organ—the publishing agency—of the Corps of Engineers on the Lakes. The seven engineer districts with the Lake Survey fleet added, makes a strong aggregation to report the things of interest to navigation.

"But we want to add something to this aggregation. We want more reports from the masters of the Lakes. We placed in your hands some time ago information blanks asking you to use them in the service of navigation. We have had small returns from this. It has been disappointing. We believe you can give us more if you will—and want you to do it. When you strike anything locate it with a buoy, or by bearings, and notify us.

"The expense of the Lake Survey information service is considerable, and in the future it may not be possible for us to get out a bulletin oftener than every two years.

"Now about surveys:—You will say we have been working for half a century and we ought to be done by this time. Congress has said this, but perhaps without full knowledge of the facts. The Lakes are so big, and wind and wave interfere so much that it is a long job. Back in 1880 when the original surveys were wound up, the men in the field knew the work was not complete. But Congress was perhaps impatient of the expenditure; the vastness of the development of commerce of the Lakes was not anticipated, and so the work was *discontinued* when it was not *done.* Up to that time, 1880, the cost of surveys was not large—about six cents an acre. Since 1880 we have spent about one cent and a half an acre, and we want in the next 10 or 12 years to spend 2½ cents an acre more.

"This makes a total of 10 cents an acre in all. Remember each acre is worth $140—more than farm land in Ohio—and each acre has a present earning capacity of $2.80 a year. For 10 years' work we want to tax the right-of-way a *little more than the cost of a postage stamp on each acre.*

"There are three good reasons why these surveys should continue:

"First,—in the interval of a quarter or a half century since the original surveys, *geological changes,* have taken place, creating new shoals and changing depths. A great storm never lashes the Lakes without setting up currents which shift the sandy bottom and wash and undermine the banks, making the shores recede; and these sands are sucked into the waves and distributed. It takes a good many dredges to keep our harbors clear of these shifting sands.

"I was looking over an old chart of Lake Erie the other day, issued in 1852, and out beyond Pt. Pelee,—just inside of the Old Dummy Light,—the map shows a knoll, a hill of sand. It is not there now. It has been swallowed up by the leveling waves and the sand in it has helped to build up Southeast Shoal. And on this map there was no Southeast Shoal, no Grubb Reef, no Grecian or Waverly or Seneca Shoal. They had not been found at that time, and the navigators of that day did not care about them anyway because they could sail over them.

"Every river that flows into the Lakes brings its contribution of sand and silt to build up shoals,—as at the mouth of the Detroit river.

"Well, the millions of tons of sand that were part of the shore when the old surveys were made are under the water of the Lakes now, and they slowly shift in the currents that come with great storms. Capt. Whitney, of the Morse, found 24 feet ten or fifteen miles off Chicago out in the middle of Lake Michigan, and believes Lake Michigan to be shoaling up at the south end.

"Another geological influence is *ice.* Wherever there is a current, anchor ice forms on boulders—and in shallow water field ice also,—and shifts them from place to place. An ice field lodged against a shoal will pile up the sand and gravel before it. Ice is credited also with moving wrecks sunk in 35 feet of water.

"These old wrecks lying on the floor of the Lakes are still serious menaces, because they were not blasted out deep enough back in the days of shallower drafts, and are now in part forgotten. We are sweeping these wrecks, and find too little water over them in many cases. We found only 19½ feet over the wreck off Thunder Bay Island in Lake Huron, —this has been dynamited since. In Lake Erie the *Grand Traverse* still has only 19 feet over her at standard low water; and the *Armenia* down by Pelee Passage showed clear for only 13 feet. The *Specular,* we swept in 1904 and found only 16 feet over her.

"When you bump something and tear out a few plates your manager may think you were off your course. Sometimes you *are,* but not *always.*

"The second reason why surveys are needed now is because the surveys of 30 or 50 years ago did not anticipate the deep drafts of today or the deeper drafts of the near future. An 18-foot spot was a *shoal* 30 years ago. Today a 24-foot spot is a *shoal,* and a danger to 20-foot navigation. The surveys of 30 years ago did not develop carefully water of greater depths than 18 feet. Today we work carefully down to 30 feet. Even in still water you need nearly a foot for squat, and when a gale is blowing you need a foot or two more under your keel for the surging of your ship.

"Now, when a gale is blowing the water piles up at the weather end of the lake and lowers at the windward end. The west end of Lake Erie has lowered 6 feet in such a case. At such times if you have tried to go over a 24-

foot spot you understand why it is a *shoal.* But it was not a shoal, 30 years ago, and was not surveyed in many cases. A good many spots of that kind are still to be discovered.

"Another thing you have never had, but it seems to me you need for sound navigation, is a better knowledge of depths out in midlake, away from the shores. There are a great many blocks on the Lakes *with 500 square miles in each where we have no soundings whatever.* We hope to sound these in the next few years.

"The *final reason* why we want to do considerable more work, examining the bottom and searching for shoals and wrecks is because modern methods and equipment allow us to work so much better now than in the past. We can find obstacles very easily now, that were almost impossible of discovery by the old lead line method of work. We now *sweep* where the old surveys *sounded* with a lead line. The lead line is all right in its place, but its place is not on a hydrographic survey. No wrecking master would look for a wreck with a lead; he would drag for it. But a drag is a slow, clumsy affair that cannot successfully be used on extended surveys because the cost runs up too fast. You know what a drag is? A long weighted line with a tug at each end, and the tugs run abreast with the line stretched between them dragging on the bottom. It will locate a wreck, but it costs a good deal to do it. You also know what a sweep is, as it is used on the dredge cuts in St. Mary's river and in the lower Detroit river—a raft with iron bar suspended at a fixed depth. But the bar sweep is too slow also.

"Out in the open lake we needed something that would cover several square miles in a day's work, and something that would not have to be towed into a harbor at night.

"We have succeeded in perfecting a *tension wire sweep* that will examine 5 to 10 square miles in a day's work,—sweeping and sounding at the same time,—and when the day's work is done the sweep is reeled up on the deck of the steamer. The wire sweep is a Lake Survey invention, but it has been adopted by the Coast and Geodetic Survey for use on salt water also. It is very simple—a little over a quarter of a mile of steel wire, or small cable a tenth of an inch in diameter, is run out with a launch on each side of the survey steamer. The wire is buoyed every 100 feet, suspending it at 30 feet below the water surface, and held down by weights. When each launch has its full length of wire stretched out, the steamer and the two launches wing-and-wing proceed on parallel courses. Each launch heads a little outside of its course, and in that way a tension of about 150 pounds is maintained in the wire, which holds it taut and level. The sweep covers a belt half a mile wide, moves at a speed of about two miles, and so sweeps a square mile in an hour. At the same time soundings are taken from the survey steamer and both launches. Everything with less than 30 feet of water on it is detected, whether it is a shoal, a boulder or a lone spar, reaching up from a deep lying wreck. When an area has been swept it may be certified clear of obstacles.

"No method of sounding alone can certify the bottom. Pinnacle rocks, boulders or spars are likely to stick up between the soundings. Now that we have found a practicable inexpensive method of sweeping, we propose to do a great deal of it.

"The crucial test, as to whether surveys are needed on the Lakes or not, is this: Do we find anything? On this question we stand squarely on our record. We *always* get something. One party discovered 31 new shoals on the St. Lawrence river in one season. Three new shoals were discovered in Lake Erie in as many weeks. During the past season our steamer *Search* swept east of Thunder Bay Island and found a shoal and a wreck. Then the *Search* went up to the north end of Lake Michigan and located four new shoals, and in the fall she swept in the Straits and picked up three more new shoals. On account of these new shoals in the Straits the sailing course was moved about a mile to the northward. This is only part of the work of the *Search* for the past season, but she found eight new shoals and one dangerous wreck.

"At the same time the *Gen. Williams* was sweeping in Lake Erie, and she discovered three new shoals and three wrecks. And this is only part of her work.

"Our small steamer, the *No. 1,* with a small party, was engaged mostly on Lake Michigan harbors, but she located the new shoal off Grosse Point, where the *Reed* went on, and spent about a month searching for Capt. Whitney's shoal. When we find *that* we will call it the *Whitney* Shoal. In addition the *No. 1* did some work preparatory to the extensive survey of the south end of Lake Michigan we expect to begin the coming season.

"Our steamer, the *Surveyor,* was not in commission, we did not have money enough to operate her, and our small steamer *No. 2* is having a rebuild.

"We have blocked out surveys enough to engage our fleet for the next 10 or 12 years, and are asking Congress to put us on a continuing basis,—that is, assure us a certain length of life on a large scale, in order that we can economically and persistently complete the adequate survey of the Lakes. After that is accomplished a much smaller organization can handle the work of issuing charts and bulletins and making such small surveys as progressive changes warrant.

"We expect to sweep Manitou Passage next spring, and open it again for deep draft boats. There are doubtless some isolated boulders in there not shown by soundings.

"In our general project, we expect to work in Lake Superior from Sand Island westward, do considerable work about Isle Royal, do some work in the approach to Whitefish Bay and the St. Mary's river; in Lake Michigan, the north and south ends of the lake, and along the whole west shore, from Sturgeon Bay Canal southward. We continue work in the vicinity of the Straits and sound along the west shore of Lake Huron, Saginaw Bay, and from Pt. Aux Barques to Port Huron; also the east and west ends of Lakes Erie and Ontario; and, as I said before, the middle of all the Lakes. It is a big undertaking, but is fully warranted by the needs and importance of the commerce of this great inland waterway.

"I intended to say something about Lake levels,—but I am using up too much time. Major Keller has put in your hands our Hydrograph of the Lakes, showing monthly stages from 1860 to the past November. It will pay you to study this and find out to what extent the loading capacity of your vessels is dependent upon the caprice of nature. You will find that in November, 1895, Lake Erie was 1.6 feet lower than it is now. This means a loss of 16 per cent of your carrying capacity. Remember that Chicago alone wants enough water to cut the lakes down over 8 inches, and the power companies at Niagara Falls want some water that may cut down the Niagara River and possibly Lake Erie also.

"Now, I am not sure that an independent outlet at Chicago and an increased flow capacity in the Niagara river are evils from the point of view of navigation on the Lakes, but unless we have regulation the evil is unquestionable. Regulation is sure to come because, otherwise lower water by half a foot than that of 1895 is in store for navigation. The hydraulics of the rivers, and the gathering of data on Lake levels needed to solve this vastly important subject, has been part of the work of the Lake Survey and must be continued.

"Now, to summarize, I believe there are a lot of things the Lake Survey can give you. You want navigators' charts, and you want them kept up to date.

You don't want old *charts* any more than you want old *almanacs*. You want the Lake Survey Bulletin, and you want a fresh, revised edition every year, or every two years. You don't want *ancient history,* you want the latest word. Then you want supplements every month, or oftener, giving the latest changes and discoveries, and you want immediate warnings of dangers flashed by telegraph over the Lakes. You want us to sweep and sound the Lakes to find new shoals and old wrecks before you tear your bottoms out of them. You want us to do magnetic work out on the open lake.

"You want us to guard the Lake levels and keep the Lakes deep for you. You do not want the low water of 1895 repeated.

"You turn to us as hydraulic engineers and surveyors and experts on forty different questions.

"We have the equipment—steamers and instruments—and we have the men who know how to do these things best—but we want something more. We want the *active co-operation of every vessel owner and every vessel master on the Lakes,* and we want this even more strongly now, and for the future, than in the past;—and in closing I want to say that community of interests between us is a fact and not a figure of speech."

CLARK WIRELESS STATION AT SAULT STE. MARIE

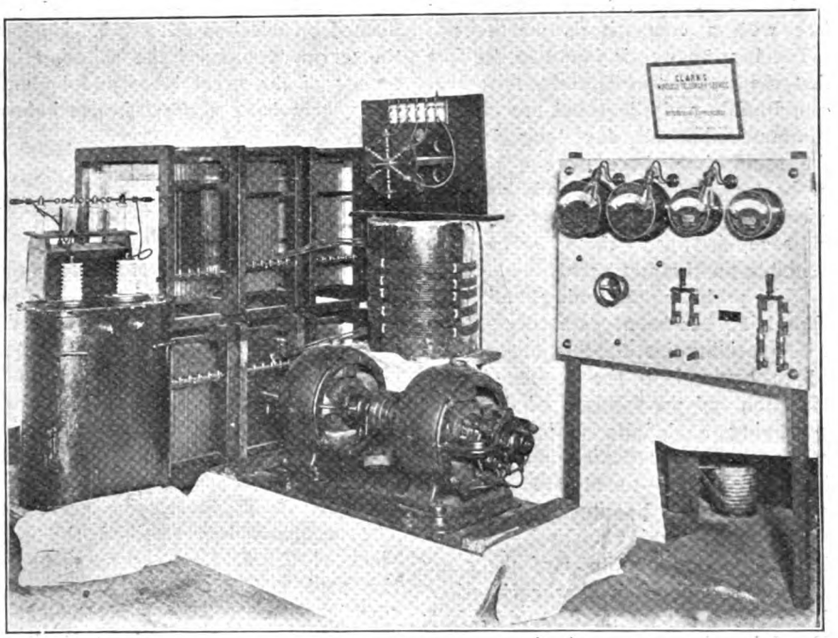


PHOTO SHOWING LARGE POWER AND MOTOR GENERATOR SET WITH TRANSFORMERS, CONDENSERS AND OPERATING SWITCHBOARD FOR CLARK WIRELESS TELEGRAPH STATION AT SAULT STE. MARIE.

During the season of 1907 the Clark wireless system demonstrated to the marine interests of the inland seas the rapidity, accuracy and absolute reliability of its wireless service. The telegraph work was a revelation to those who used the service. Few, if any, have even a faint idea of the genius, the devotion and hard work that made it possible to send those wireless messages through space with such accuracy and precision.

With the opening of the Sault station this season, another great stride will have been made towards the further usefulness of the Clark system in connection with the marine interests on the great lakes. It is Mr. Clark's aim to make the Sault station the most complete wireless telegraph station to be found anywhere in the world and among the instruments and apparatus are devices which have not yet been introduced anywhere else.

The station will be manned by three operators—a chief operator and two subordinates. It is intended to divide the tricks into a nautical fashion of eight hours each. The most important part of the 24 hours will be in charge of the chief operator.

The station is of a 25 K. W. capacity and the electrical current and power to supply the transmitting generator set is taken from the water power company's mains at the Soo and brought into the station at a pressure of 500 volts. This connects direct to the controlling switchboard. From here the connections are led to the various parts of the controlling apparatus, which includes automatic motor, starter, voltmeters, and ammeters and field control to regulate the speed of the generator set, all mounted on a polished marble switchboard. On the switchboard is also mounted the frequency indicators, including reactance regulators and automatic starter, so that the operator can control immediately at his right hand the full manipulation of any part of the apparatus and tell by one glance of the eye at his recording instru-

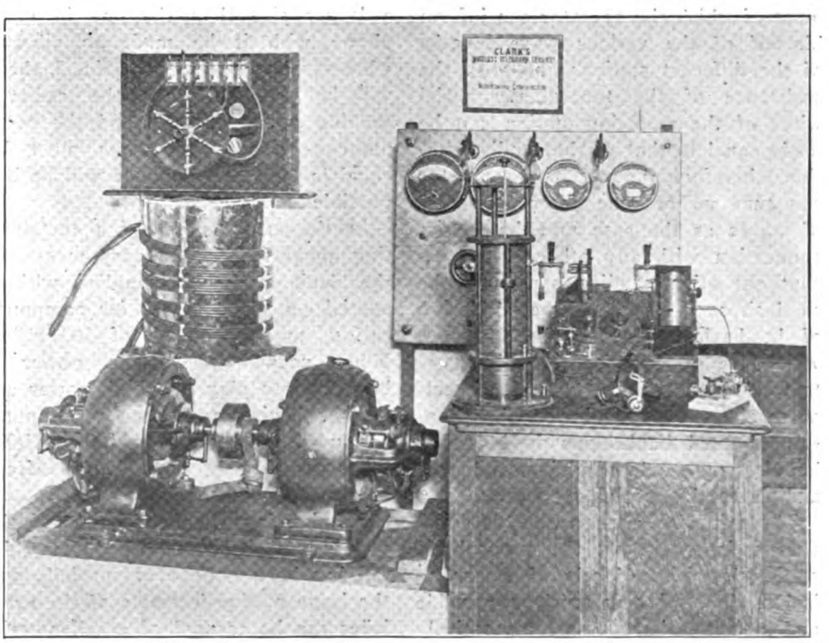


PHOTO SHOWING A COMPLETE SYSTEM OF RECEIVERS AND CONDENSERS AND INTERFERENCE COILS ON OPERATING TABLE WHICH SITS DIRECTLY IN FRONT OF SWITCHBOARD FOR CLARK WIRELESS STATION AT SAULT STE. MARIE.

ments exactly what output and results he is obtaining from his apparatus and instruments.

The transmitting current, as stated, enters the station at 500 volts and is stepped up through 25-K. W. oil insulated transformer to 80,000 volts. Shunted across the spark gap is the primary of the oscillating transformer connecting with 20 crates of oil insulator condensers. The top end of the secondary coil of the oscillating transformer being connected to the center terminal at the multiple aerial spark gap and the lower end or outer terminal of the oscillating transformer connects to the earth connection. The most perfect, up-to-date receiving sets are provided for the receivers for the Sault station, considerable time having been devoted to the working out of a complete system of tuners which makes this outfit a distinctive one as it is not to be found on any other wireless telegraph station in the world and it plays an important part in the accuracy and reliability of wireless communication. With this complete system of tuners, the Sault station will be able to get in communication with any other station or boats on the great lakes and can also cut in or cut out any other station that would like to communicate with that station, no matter what the tune of these may be. In other words, the wireless tuner, installed at the Sault station, is arranged so that the operator can isolate and select the station with which he is desirous of communicating. The tuner is arranged with a combination of inductance and capacity by the adjustment of which the operator can inform himself of the various wave lengths of the different stations and with the assistance of the tuners, the aerial wires of the receiving station can be made equal to that of the sending station, therefore the receiving operator can tune up or tune down the scale of waves as the case may be to get connection with any other station or shut out other sending stations if he so desires. There is a special design of head-telephones for the operator, which are of the most sensitive type to work in connection with the detector receiver circuit and with the properly adjusted diaphragms the incoming impulses are rendered plainer and more audible to the receiving operator.

There is also a system of interference coils to cut out the atmospheric static electricity, developed so as to isolate the station as much as possible and in fact to have it as comparatively free from electrical interference as possible, which marks an important advance in the perfecting of the system for commercial work.

During the experimental stage of the wireless telegraph, a good many people feared that it would never attain full usefulness and many laymen are today skeptical on many points of the commercial operation of the wireless stations.

It is claimed by many that the electrical impulses sent out by powerful stations would interfere with those of a feeble station or of less power. Again, could interferences be rendered impossible or could an operator interfere with a competitor's messages.

The best answer is found in the fact that the stations at Detroit, Port Huron, Buffalo and Cleveland are in daily communication all day long and at the same time there were a number of boats crossing Lake Erie carrying wireless apparatus, yet not a single message between these stations is readable on the steamers.

This problem of tuning and synchronizing has been practically solved. The receiving instruments are adjusted to respond to the frequencies of vibration and wave length of the ether occupying a definite period and all other waves than those for which the instruments are tuned are screened out. This may be illustrated by the action of the tuning forks by arranging the two tuning forks of the same sized tone and pitch near each other. By striking No. 1 fork, tuning fork No. 2 is affected through the medium of the air and responds audibly. This is what we call sympathetic resonance. But let No. 3 tuning fork, of a larger size than the one in symphony with it be made to vibrate, whatever its proximity to No. 2, there will be no sound, for the radiator sending out the waves and the resonator receiving the waves must be equal in tune or resonance will be impossible.

In the arrangement of a transmitting apparatus for ordinary messages, the Sault station is supplied with a special set of apparatus for communicating to a distance of 100 miles. When needed, the large power is brought into play, the high power apparatus having a maximum communication distance of from 500 to 1,000 miles, varying in wave lengths from 500 to 30,000 meters.

In planning the installation of the station and its equipment, every detail has been gone over carefully and the large marine interests of the great lakes can be assured of excellent telegraph service from this point.

Messages will be sent direct into Cleveland, Buffalo, Detroit, Duluth, Chicago or Milwaukee from the Sault as easily as the Port Huron station sends messages into Cleveland or Buffalo. The value of the service can be readily seen as the master of a boat can report on coming into the locks or canal and have a reply from the owner or manager before he is through the locks. This service cannot be rendered by the wire lines. The rapidity of the wireless telegraph service is without parallel.

Mr. Clark is a master of his art and no man in the world is better informed on wireless telegraph. He has the warm support of the shipping interests of the great lakes and he and his system have a great future before them.

LANE & DEGROOT PLANT PURCHASED.

A. P. Lundin has purchased the stock, factory and good will of the Lane & DeGroot boat building establishment in Long Island City and has resumed the boat building business there. The directors of the reconstructed company are: A. P. Lundin, president and general manager; Capt. John C. Silvia, secretary and treasurer; R. H. E. Starr, vice president. The company has retained the services of C. M. Lane as manager of the yard and of A. H. Sawman as superintendent. The general offices are with the Welin Quadrant Davit at 17 Battery Place, New York. The company is preparing to give estimates and build life boats and life rafts of every description, as well as steam and power launches and Englehardt collapsible life boats.

Bids received at the office of the inspector of the second lighthouse district, Boston, Mass., on Jan. 22, for making repairs to the tender Maple, were as follows:

Lockwood Mfg. Co., East Boston, Mass $1,578.35
Bertelsen & Petersen Engineering Co., East Boston, Mass.....$1,890.40

The bid of the Lockwood Mfg. Co. was accepted.

Announcement was made that the Mutual Transit Co. will abandon Escanaba as a port of call owing to the unsatisfactory amount of business offering there.

The Grand Marais life saving station will be equipped with a power boat at the opening of navigation.

HARBOR IMPROVEMENTS AT CLEVELAND

The constantly increasing tonnage carried by the internal waterways of the country, particularly along the great lakes, has resulted in the last few years in a largely increased size of vessels. The great ships of the present day carrying the bulk of the vast tonnage of ore, coal and grain have a length of more than 600 ft. Harbor facilities ample to accommodate the lake carrier of a few years before, as the size of the vessels increased, became taxed beyond all possibility of the economical handling either of ships or cargo. This state of affairs and the certainty that the future would bring a further increase in the dimensions and tonnage of vessels induced both the federal and local authorities at all the principal lake ports to take steps for the improvement and development of the internal harbor systems afforded by the rivers that had brought to these cities their early prestige as lake ports. The city of Cleveland, O., at the mouth of the Cuyahoga river, was one of the first of the

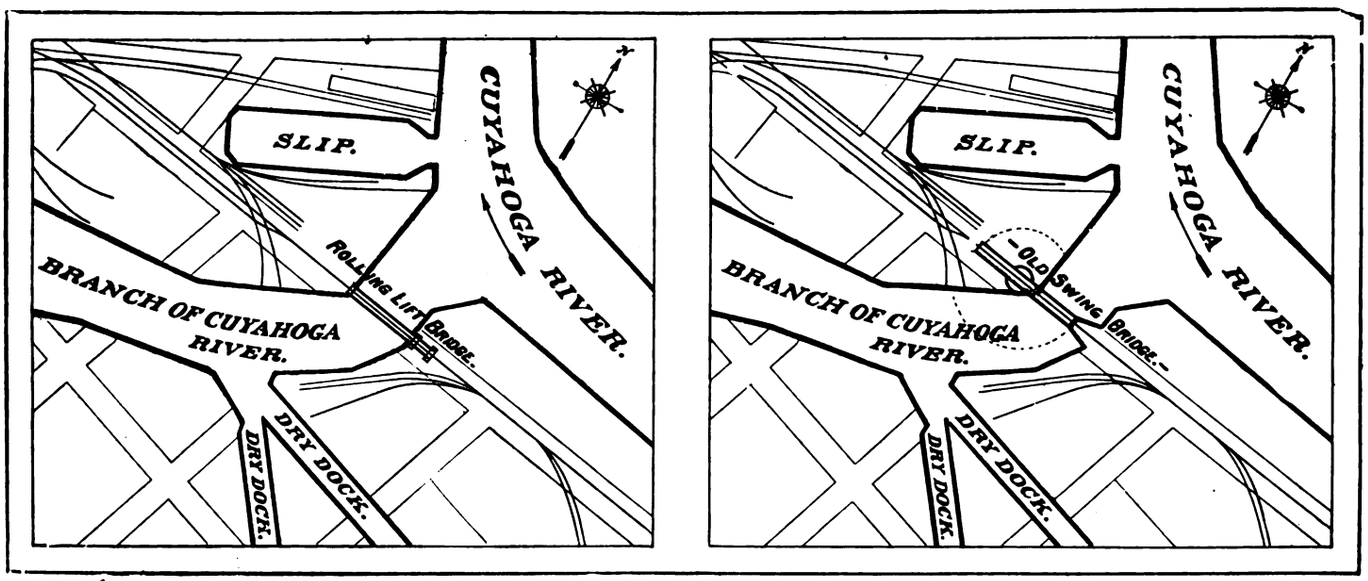


FIG. 1—PLAT SHOWING COMPARISON OF CHANNEL OF OLD SWING BRIDGE AND NEW SCHERZER ROLLING LIFT BRIDGE FOR B. & O. RAILROAD ACROSS THE CUYAHOGA RIVER AT CLEVELAND.

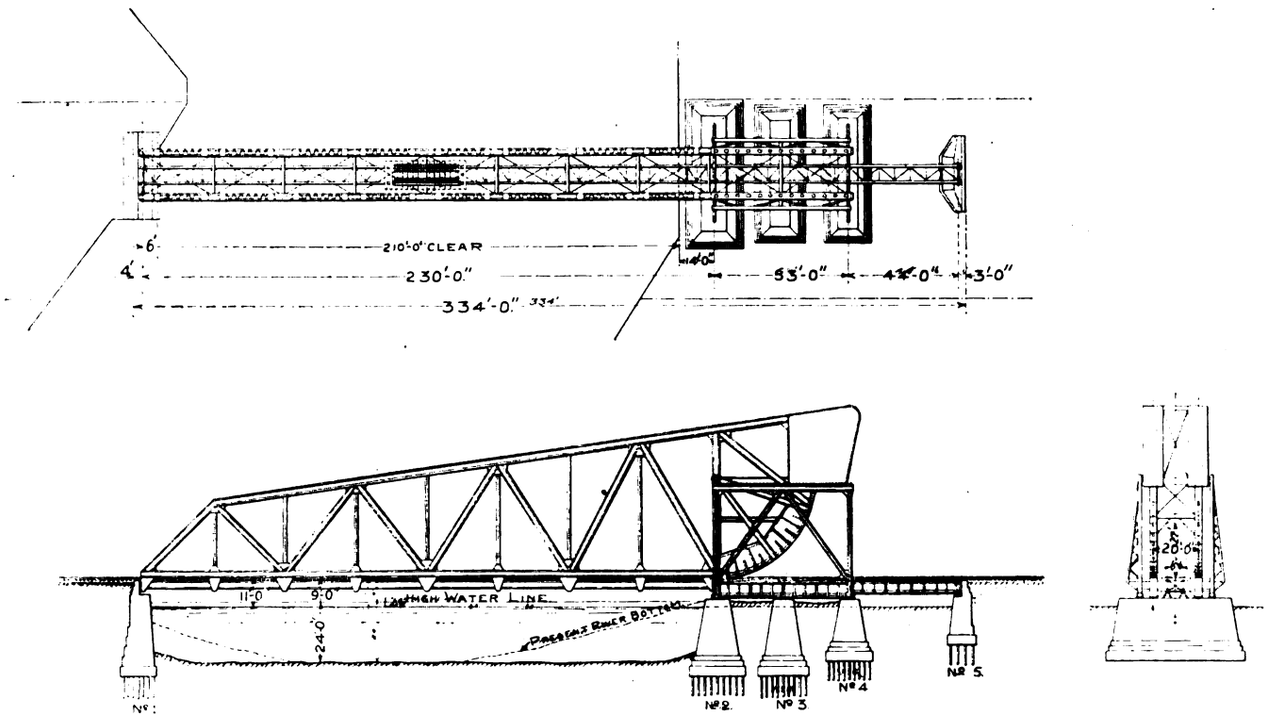


FIG. 2—GENERAL PLAN OF SCHERZER BRIDGE FOR THE B. & O. RAILROAD AT CLEVELAND.

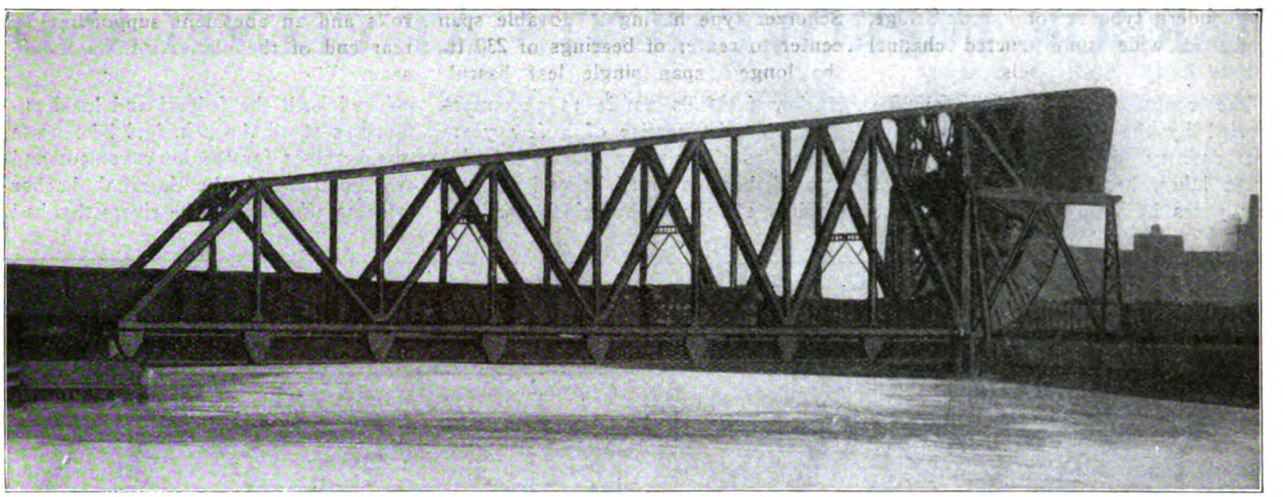


FIG. 3—VIEW OF NEW 230-FT. SPAN SCHERZER ROLLING LIFT BRIDGE FOR B. & O. RAILROAD AT CLEVELAND IN THE CLOSED POSITION.

large lake cities to recognize the necessity of improving the river as a means not only of conserving vested interests but of developing the entire valley of the Cuyahoga river into most advantageous and economical sites for manufacturing industries and railroad terminals. Economical and convenient terminals for the interchange of freight is one of the most vital problems confronting railroad managements of the present day. Freight terminal property centrally located is becoming a constantly increasing tax on railroad capital, the necessary ground areas constantly increasing with the growth of population, industries and resulting increased traffic.

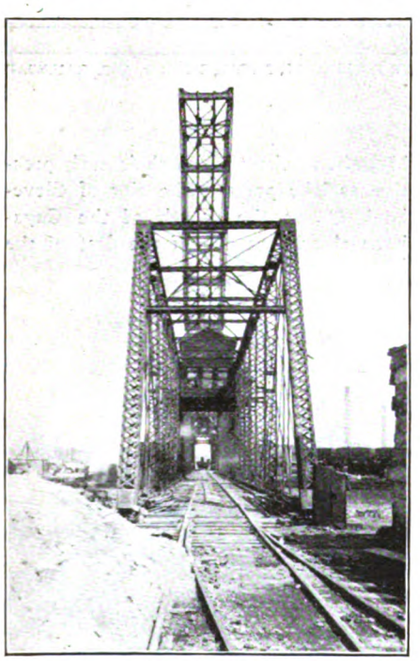


FIG. 4—END VIEW OF NEW 230-FT. SPAN SCHERZER ROLLING LIFT BRIDGE FOR B. & O. RAILROAD AT CLEVELAND, SHOWING MAINTENANCE OF TRAFFIC DURING CONSTRUCTION.

The Cuyahoga river pursues a very winding course for several miles through the heart of the city of Cleveland. It has only one branch known as the old river bed which runs westerly for about a mile from a point a few hundred feet inside of the harbor mouth. The river originally was narrow, shallow and crooked, but in the process of improvement it has been widened, deepened and straightened, and projects are now pending that will remove the remaining natural obstructions in the course of the stream.

In a city the size of Cleveland, with so important a navigable waterway through its center, the matter of movable bridges has naturally been a subject of important consideration by both municipal and federal authorities. More than 20 bridges, both highway and railroad, now span the river. These structures were originally nearly all of the center pier swing type and for the most part very obstructive to the navigation of the river by large vessels. A policy of new bridge construction along modern lines was inaugurated early in the campaign for an improved internal harbor and has resulted in the removal of a large number of center pier swing bridges and the construction in their stead of

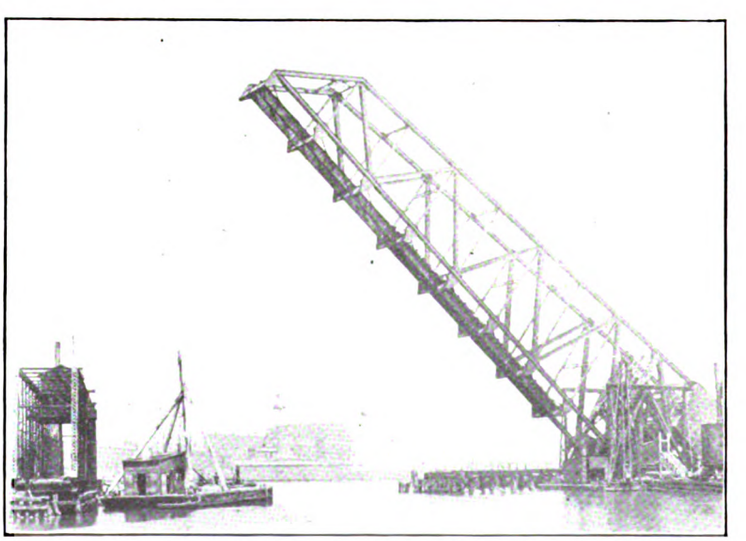


FIG. 5—SIDE VIEW OF NEW 230-FT. SPAN SCHERZER ROLLING LIFT BRIDGE FOR B. & O. RAILROAD ACROSS CUYAHOGA RIVER AT CLEVELAND, SHOWING MAINTENANCE OF TRAFFIC DURING CONSTRUCTION.

the modern type of rolling lift bridge, giving a wide, unobstructed channel for the passage of vessels.

One of the most important changes in bettering conditions so as to facilitate the handling of vessels of the largest size was the recent reconstruction of the Baltimore & Ohio Railroad Co.'s bridge across the old river bed on the line of West River street. A long span single leaf Scherzer rolling lift bridge was completed and placed in service at this site a few months ago. It replaced a swing bridge used by the railroad company for many years to reach the extensive ore docks on the north side of the river. Fig. 1 shows a plat contrasting the channel of the old and new bridge, the old bridge having its center pier on the westerly side of the river with an approach extending well out into the channel on the opposite side. In the new structure the main supporting piers on which the bridge rolls are placed on the easterly side of the river with the front or rest pier on the edge of the far side of the channel, making the entire width of the river available for navigation. The plat illustrates, too, the particular advantage of the rolling lift bridge in making available all dock space adjacent to the bridge, the disadvantage of the swing bridge in this respect being materially more apparent when the main pier is located at one side of the channel as was the case in this instance.

A general plan of the new bridge is shown in Fig. 2. Fig. 3 is a photographic view showing the structure in the closed position carrying a train of freight cars. As will be seen from the general plan the bridge is a single leaf single track through bridge of the Scherzer type having a movable span center to center of bearings of 230 ft., the longest span single leaf bascule bridge in the world, the clear channel for navigation measured between faces of piers being 210 ft. The total length of steel work, including the short plate girder fixed approach span at the rear end of the bridge is 334 ft. The bridge has a width of 20 ft. center to center of trusses and a minimum clearance of 22 ft. above the ties. The counterweight is of portland cement concrete carried in steel boxes in the plane of each truss, the bridge being counterweighted so as to be at rest in all positions.

The bridge is operated by two alternating current electric motors of 75 H. P. each, the controller governing the motors being placed in the operator's house. The motors are equipped with solenoid brakes operated by an independent switch on the switchboard in the operator's house. The power is applied in the operation of the bridge by pinions on the main operating shaft engaging with fixed racks placed on independent supports outside of each truss. The operator's house also contains indicators which show to the operator, both day and night, all positions of the bridge during operation. Indicators are also provided showing the positions of the end latch. Signals are placed at each end of the bridge interlocked with derailing switches and with the end latch and main operating controller so that the bridge cannot be operated until these signals have been set at "danger" and the derailing switches opened.

The substructure consists of one front pier, three main piers carrying the track girders on which the bridge rolls and an abutment supporting the rear end of the plate girder approach span. These piers are of concrete carried on piles.

An interesting feature of this work was the erection of the new bridge in its open position without interfering with the railroad traffic over the old swing bridge or the operation of the old bridge for the passage of vessels. Figs. 4 and 5 show the method of erection employed, the front pier of the new bridge being constructed under the old swing span on the channel side of the center pier. The main piers of the new bridge were built under the approach to the swing, the superstructure being erected on these piers so as to provide ample clearance for the operation of trains over the old bridge at all times.

The bridge was built for the Baltimore & Ohio Railroad Co., and was constructed under the charge of the railroad company, J. E. Greiner, assistant chief engineer, the design being prepared under the specifications for material and workmanship for steel structures and the design and erection of bridges of the Baltimore & Ohio Railroad Co. The design of the superstructure, operating machinery and electrical equipment was prepared by the Scherzer Rolling Lift Bridge Co., Chicago, Albert H. Scherzer, president, the Scherzer Rolling Lift Bridge Co. also maintaining a general consulting engineering supervision over the construction and erection of the bridge. The substructure was designed and built by the railroad company. The contract for the superstructure was executed by the King Bridge Co., Cleveland, erection of the steel work being done by the Pittsburg Construction Co.

"IN THE MERCHANT SERVICE"

"Going to bed?"

Higgins turned with a scowl to receive his visitor. He was not overfond of company at any time, and, as he had been deeply interested in a novel for the past two hours, leaving himself a bare two hours for sleep, wanted especially at this time to be very much alone. He was rapidly disrobing.

"Where do I look as if I were going?" he growled. "Down below?"

"Well," responded his visitor, the third engineer, "if the concert in the saloon hadn't just broken up a person could be excused for thinking you might be going to favor the company with a few steps from the 'Merry Widow.'"

Not being sufficiently versed in repartee to make a rejoinder on the spur of the moment, the fourth proceeded to attire himself in his pajamas, meanwhile bestowing a withering look on his room-mate. The third was filling his pipe from Higgins' stock of tobacco, watching with intense interest the other's actions.

"Doesn't it hurt you to sleep in that suit?" he asked, as the fourth sulkily yanked at the waist lanyard. "That pattern is certainly the cutest little thing," he added.

"Some people I know could sleep along the soft side of a hand-rail, in any darned old thing," growled the baited fourth, "darned if I ever saw such a ship-load. Take yourself, for instance," he continued, "you manage to put in about 10 hours out of the 24 on your back. No wonder your brain is softening."

This last shot was delivered as he climbed into his bunk, but the third refused to feel injured. Instead, he pointed out the advisability of storing away sleep against such times as it would be needed, when the call to duty means a long spell below and bunks are but a distant memory. He also pointed out the value of sleep in building up the human frame, and the benefits of retaining the body in a position

"DOESN'T IT HURT YOU TO SLEEP IN THAT SUIT?" ASKED THE THIRD.

of repose. As he was on the 4 to 8 watch he could speak as one well versed on the matter.

"You are going on watch at midnight," he proceeded, "and if anything turns up in the way of a breakdown between now and then you will be hurriedly called. You know," adopting a fatherly tone, "you really ought to have been in bed a couple of hours ago."

"Two hours'll do me," said the fourth as he rolled into the blankets. "Switch off the light when you get through."

"Don't be too sure of even the two hours," continued the aggravating one, carefully ignoring the broad hint that peace would be appreciated, "suppose, for instance, the chief decides to put a turn of soft packing in that valve-stem gland that's blowing so badly. This is about the best hour for a job like that. Suppose a fan engine gives out, or a feed pump, and you are turned out to do your little bit. You are certainly taking chances."

"Chances nothing," said Higgins in a tone intended to close the conversation, "the old man won't stop her to pack that gland the way it is now. The main engines never ran better than they are doing now, and have not been stopped for anything but the telegraph for six months. The fan engines are running easy and quiet, for which you, I suppose, being in charge of the fire-rooms, take the credit. The pumps were never in better shape, thanks to me, so, you see, I am all right for a couple of hours."

By this time the curtains had been arranged with elaborate care across the front of the fourth's bunk, and the third's most seductive remarks failed to draw any response therefrom.

Suddenly, seemingly faint and afar off, the long low blast of a steamer's horn broke forth on the night air.

"Fog," said the third. "Fog," he repeated, in a louder tone. The figure behind the curtains stirred uneasily, but took no other notice of the remark. Again the mournful wail of the horn penetrated to the most remote corners of the vessel and spread itself over the waste of water.

A sharp tap at the door was followed by the appearance of an oiler from the engine orom.

"Is Misther Higgins aslape, sorr?" he asked the third in a hoarse whisper. The third nodded his head in the affirmative and motioned the oiler to awaken his room-mate.

"Shtand by, for fog, Misther Higgins," said the knight of the swab-brush, as he gently pulled the curtains aside and found the fourth very much awake, "the horn's blowin'," he added.

"Do you think I'm deaf?" snarled the outraged engineer, as he jerked the curtains violently along the rail. The oiler withdrew precipitately, and the engineer climbed forth.

"Hard lines," commented the third, as he proceeded to take off his shoes and make other preparations incidental to his retiral for the night.

"Darn sea-going, anyway," muttered the fourth, as he peeled off his sleeping suit. "If it isn't one form of trouble it's another. Who expected fog at this place on the chart?" he asked of no one in particular.

"I did," answered his room-mate easily, "I could both see and smell it coming when I came in off the deck."

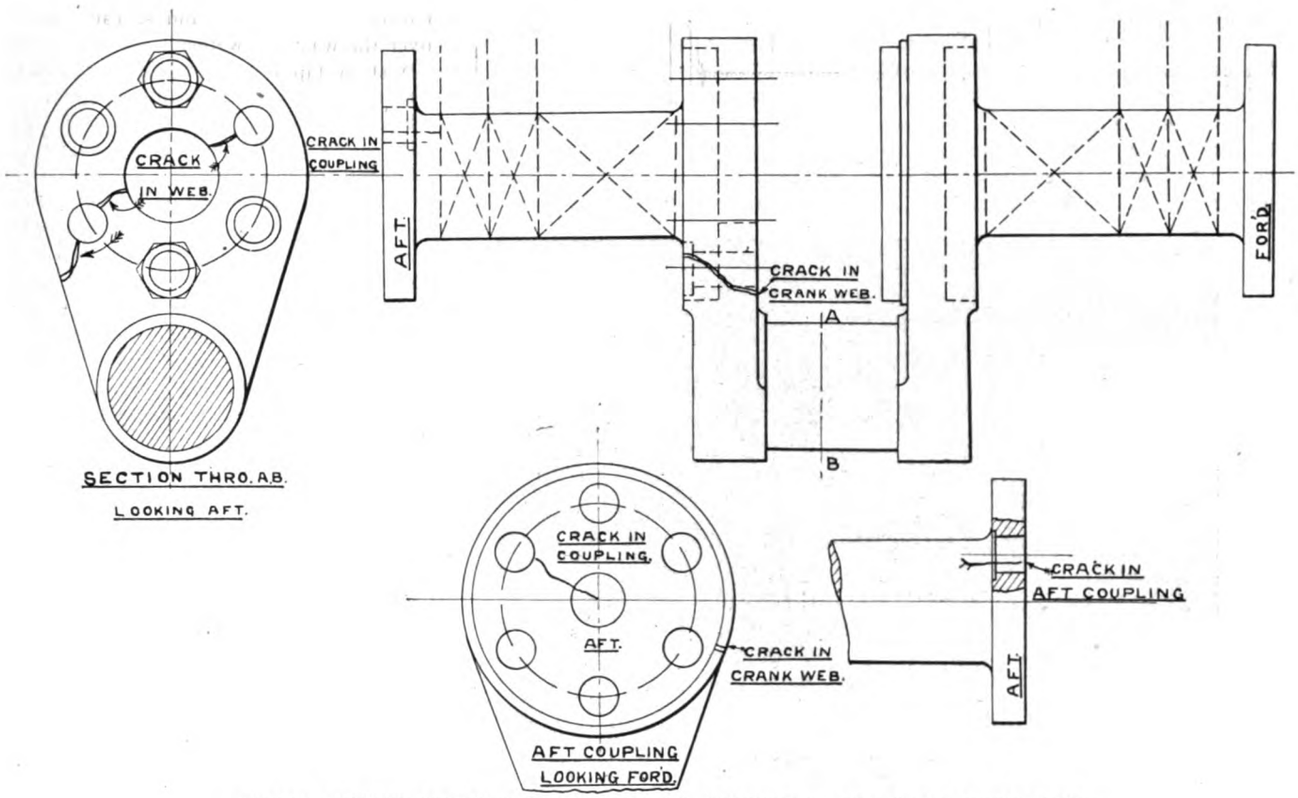
The fourth relieved his mind to some extent by slamming the cabin door as he stepped out in the alleyway. On his way below to take up his post at the levers he passed the oiler who had announced the stand-by. The oiler, unaware of the proximity of the engineer, was cheerily singing as he wiped around the "tops" with a handful of waste. This was too much.

"Cut that bawling out," barked the unhappy fourth, as he climbed down the ladder. THE "STAND-BY" MAN.

A NOTABLE ENGINEERING FEAT IN MID-OCEAN

It was not until the steamship Eagle Point, considerably overdue, arrived at Philadelphia recently, that any details could be gathered of the commendable engineering feat of Chief Engineer William Jack and his assistants in compounding the disabled triple-expansion engines of the vessel in mid-ocean. Not being equipped with a wireless installation the Eagle Point was unable to communicate the news of the mishap to her machinery, and considerable anxiety was for a time felt among shipping people on both sides of the Atlantic. The Red Star liner Vaderland spoke the disabled steamer, bringing to New York the first accurate information.

The Eagle Point sailed from London for Philadelphia, in the Philadelphia Transatlantic line service, on Jan. 11, laden with general merchandise and manned by a crew of 40, officers and men. Shortly after leaving London the vessel encountered extremely dirty weather, and before clearing the English channel was driving through a nor'easter, the worst experienced by



SKETCH SHOWING FRACTURE IN INTERMEDIATE CRANKSHAFT OF STEAMER EAGLE POINT.

the majority of the crew in many years. Gigantic combers broke over the vessel jarring her from stem to stern, and the engines, in spite of the careful nursing of the engineers, raced heavily. For 10 days the tempestuous weather continued, and on Jan. 22, at 12:30 p. m., the engines were stopped for examination. The result verified the suspicions of the chief engineer, as the intermediate crank shaft was found to be fractured in the after web and coupling.

Under the circumstances it was decided that the quickest and safest method of again getting the ship under way consisted in transforming the disabled triple-expansion engines into compound, and, with the vessel rolling heavily as she drifted before the storm, the work of transformation was started.

To change the high pressure crank into the place of the fractured intermediate both engines had to be stripped, the work being laborious and necessarily slow owing to the movement of the helpless and storm tossed vessel, and the danger attached to the handling of the disconnected parts. As each section of the engine was hauled clear of the main engines it was lashed secure till required, as, owing to the rolling movement aforesaid, it was impracticable and dangerous to leave any piece of metal around loose. In the lifting out of the fractured intermediate shaft and transference of the high pressure shaft to its place, the engine department had the assistance of the sailors from the deck. Each section of shaft weighs 3½ tons, is 8 ft. 6 in. in length, and 4¼ in. in diameter.

With the high pressure crank shaft in the place of the fractured intermediate the heavier part of the task was accomplished, and the building of the compound engine under most adverse conditions, was started. To fit the eccentric sheaves to the temporary shaft it was necessary to cut new key seats to which new keys had to fitted. This accomplished, piece by piece the work of reconstruction progressed, till on Feb. 2, the transformation was complete, and the engines were ready for steam. The original high pressure piston was stripped of packing and junk ring, dropped to the bottom of the cylinder, and valve drawn, the valve gear and other parts of the disconnected engine being made secure.

When it is considered that the accident occurred while the Eagle Point was laboring in a heavy head sea, that there was no prospect of the weather abating when the work was commenced, and that the helpless vessel during her period of disablement maintained a continuous rolling movement of from 35 to 40 degrees with seas breaking at intervals over the decks, too much credit cannot be given Chief Engineer Jack, his assistants, and the members of the crew who toiled with them "below" for 11 days and nights.

By the time the repairs were completed the disabled steamer had drifted 178 miles out of her course, the accident having occurred when 430 miles east of St. Johns, N. F. The repairs are being made at the yard of the Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia.

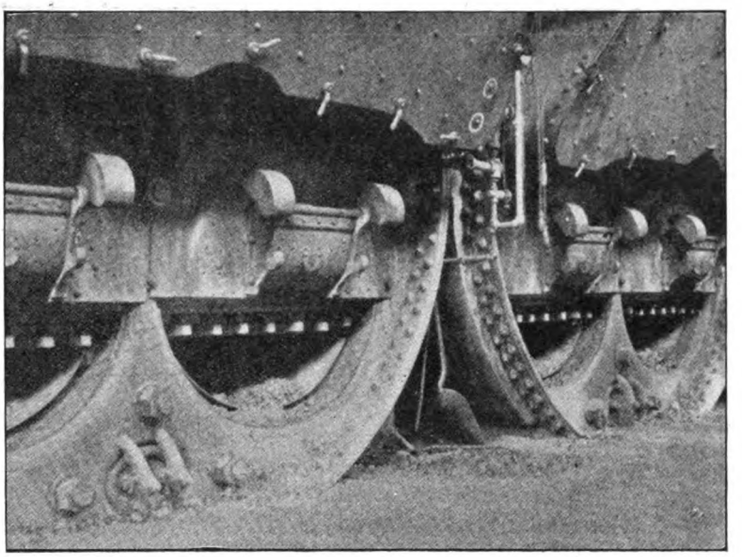
A. W. Robinson, M. A., Soc. C. E., sailed from New York recently for West Africa, having been commissioned to examine and report as to the possibilities of improving the navigation of the river Niger by dredging.

The steamer Joshua Rhodes is being repaired at the Buffalo Dry Dock Co.'s plant. About 21 bottom plates will have to come off.

The Detroit Transportation Co., Detroit, Mich., has purchased the steamer John C. Gault and will change her name to Felix Carbray. Capt. James Beauvais will be her master.

IMPROVED SHAKING GRATE.

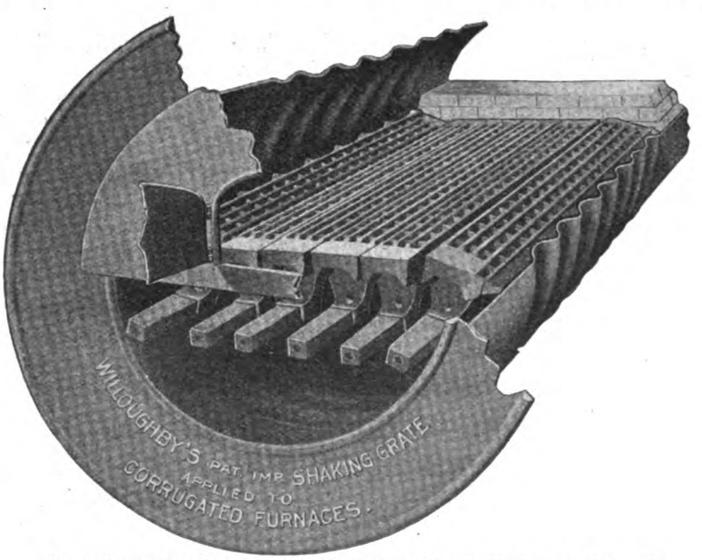
Though the ordinary type of grate bar is most generally in use aboard-ship, compared with the shaking bar it is far from satisfactory, and its upkeep forms an item of no inconsiderable magnitude in the repair and supply lists of the vessel. Its unreliability



BOILERS EQUIPPED WITH WILLOUGHBY IMPROVED SHAKING GRATE.

is well known to the engineer, experienced as he is in having two or three, or perhaps a whole set, of bars burn down unexpectedly at critical moments without any apparent cause, necessitating the drawing of the fire to renew the bars, causing considerable trouble and impeding the progress of the vessel. Their tendency to warp in a body is another serious defect, the replacing of one or two of the worst bars being impossible owing to the shape of the others, compelling the consignment of the whole set to the scrap-heap. With the ordinary grate bar, also, the adhering of clinker to the bars can only be prevented by regular and frequent use of the slice-bar, and the air space in the grate by the pricker-bar. The use of the fitted side-bar for blanking off the corrugations in a Morrison or Fox furnace on the line of grate bars also means the loss of considerable active grate area, in addition to the possibility of causing injury to the furnace at that point through pitting.

The shaking bar has been designed to overcome the many defects found in the ordinary bar, improve combustion and reduce coal bills, and, if its increasing popularity may be taken as evidence of its worth, is giving general satisfaction wherever installed. The Willoughby improved shaking grate is the only shaking grate utilizing the entire heating and grate surfaces of corrugated furnaces above the line of grate, the outside bars being shaking bars constructed to fit the corrugations, yet allowing for the free passage of air to support combustion in the extreme wings of the furnace, and preventing the deposit of ash and clinker at these points. The longitudinal ribs above the surface of the bar give a rubbing effect on the bottom of the fire, the action being sidewise as well as vertical, breaking away what clinker and ash may have formed and passing them through to the ash pit.



WILLOUGHBY IMPROVED SHAKING GRATE FOR CORRUGATED FURNACES.

In the operation the surface of the fire is never disturbed, the bottom being shaken evenly throughout. It will be seen that with this shaking grate the slice-bar need be used less frequently, and only to assist combustion, the pricker-bar being dispensed with entirely. Owing to the Willoughby grate bars being constructed on the truss principle there is no tendency to warp or twist, several installations that have been in constant use for 10 years being in as good condition as when the boilers were equipped.

Owing to the large air space, 50 per cent, in the Willoughby grate, proper combustion of the fuel is maintained through the fire being enabled to draw as much air as is necessary, and, as air is admitted under a very low velocity, the heat-units are much more easily separated and transferred from the flue gases to the water in the boiler, making the shaking grate a most economical method of burning coal. A much more regular steam pressure can also be maintained, as the low velocity will call for the constant attention of the fireman, who can always judge the condition of his fires by the glow in his ash-pits, and use his shaker accordingly. The bars are shaken singly insofar as possible, and alternately always, being free to move and easily shaken at all times.

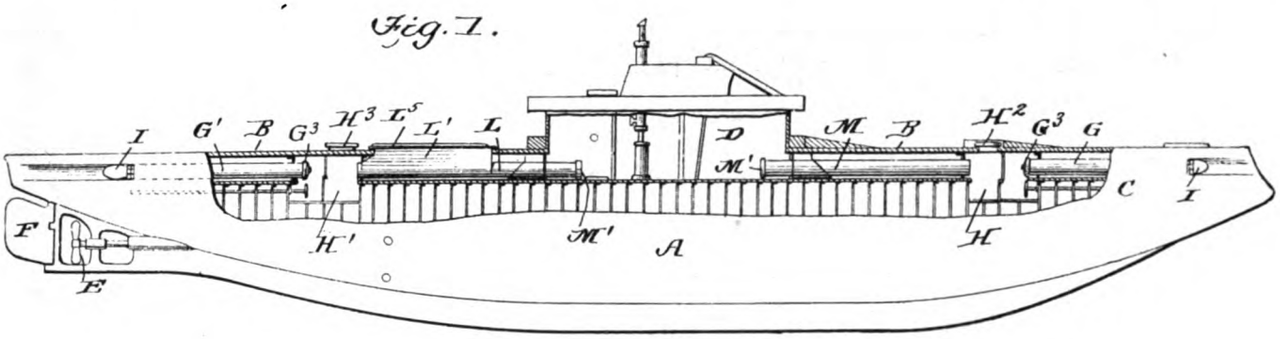
As clinker and ash are constantly being carried down through the bars, it will be seen that little or no fire-cleaning is necessary. The loss of power due to burning down and cleaning fires every 24 hours or less is avoided, as is the wear and tear accompanying the operation on the fire-tools.

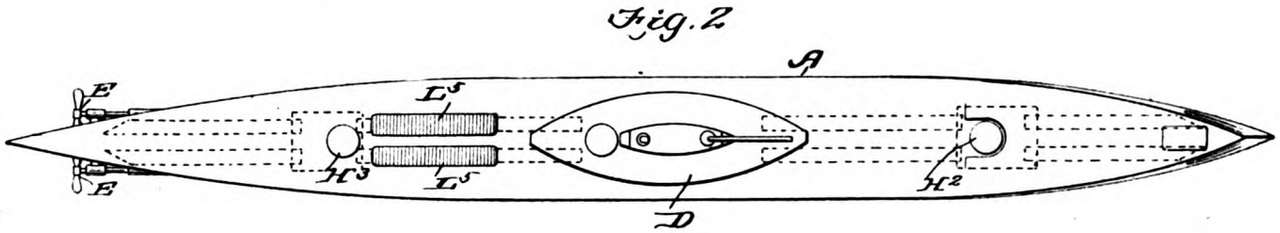
The Willoughby patent improved shaking grate is simple in construction and operation, is free from any possibility of disablement through parts becoming loose or broken, and is adapted to any style of furnace. The offices of Alfred B. Willoughby are at the Bourse, Philadelphia.

LAKE SUBMERSIBLE TORPEDO BOAT

A torpedo boat with loading and storage tubes for holding spare torpedoes, by and through which tubes the torpedoes are loaded into the firing tubes, and which are also employed to hold spare torpedoes in position to be readily inserted into the firing tubes after the initial discharge of the torpedoes in the said firing tubes, said loading and storage tubes being loaded from above and being so arranged relatively to the firing or discharging tubes that the torpedoes may be wholly or partially withdrawn from within the firing or storage tubes for the purpose of inspection or recharging, as is necessary before being discharged, especially should the torpedoes have been held in the tubes for any considerable length of time, means being provided for closing the ends of the tubes, and additional means operable from within the vessel for controlling the outboard caps or sea caps of the firing or discharge tubes, is the invention of Simon Lake, an American, at present residing in Berlin, Germany. The invention also has for its object a peculiar construction of the loading, storage and firing tubes, as well as other details.

In the accompanying drawings Fig. 1 is a diagrammatic sectional elevation of a submergible torpedo boat, showing the location of the firing tubes, storage and loading tubes. Fig. 2 is a diagrammatic plan view of the same, illustrating the location of the loading hatches. Fig. 3 is an enlarged detail horizontal section drawn on the line 3-3 of Fig. 4, one of the firing tubes and loading tubes being shown in elevation. Fig. 4 is a sectional elevation drawn on the irregular line 4-4 of Fig. 3. Fig. 5 is a longitudinal section of one of the firing tubes, Fig. 6 being a cross section of the same. Fig. 7 is an enlarged cross section drawn on the line 7-7 of Fig. 3, Fig. 8 being a similar view on the line 8-8 of Fig. 3. Fig. 9 is a detail cross section drawn on the line 9-9 of Fig. 3. Fig. 10 is an enlarged detail section, showing a slight modification in construction of the strips arranged in the storage tubes. Fig. 11 is an enlarged detail section of the strips used in the firing tubes and showing the manner of securing them in position.





The superstructure, B, is arranged some distance above the top of the circular hull, A, of the vessel, and in the space thus formed fore and aft, are the torpedo firing tubes G and G', respectively, whose inner ends extend into hatches H and H', and having hatch holes H² and H³, respectively, communicating therewith through the superstructure. Each firing tube is supported in position in any suitable manner and each is closed by a sea cap I, which is hingedly connected to the outer end of the tube. To these hinged connections are connected crank arms I', and to the arm links I², whose opposite ends are connected to cranks I³, held upon short vertical shafts I⁴, journaled in and projecting through stuffing boxes I⁵, secured to the top of the hull. The lower end of each shaft is provided with a worm wheel I⁶, each engaged by a worm J, held upon the outer end of shafts J', J', extending longitudinally within the vessel, and which have their inner ends arranged near the inner ends of the firing tubes and provided with hand wheels J³, by which the shafts are operated to open and close the sea caps. Where the shafts extend through the bulkheads of the vessel they are surrounded with stuffing boxes to prevent ingress of water from one compartment to another should either compartment be injured and spring a leak.

The torpedo firing tubes are constructed of sheet metal bent into tubular form, having the meeting ends welded together to form a seamless tube. Within each firing tube is securely fastened a skeleton frame forming a guide for the torpedo, this frame being constructed and arranged as follows: In the bottom of each tube are two longitudinal strips K, K, that extend nearly the entire length of the tube and are spaced slightly apart to provide a guide or raceway K', into which fits and slides the guide piece

of the torpedo. Upon the sides of the tube at diametrically opposite points, and in the horizontal plane of the axis of the tubes, are guide strips K^2, and in the apex of the tube in vertical alignment with the axis is a guide strip K^3, all of which are connected at intervals by circular bands K^4, which extend circumferentially from the strips K, K, and connect each of the remaining strips.

The strips and bands are secured to the tube by screws or rivets whose heads are countersunk and their outer ends are projected through the tube and headed to prevent accidental displacement. The manner of securing the bands is best illustrated in Fig. 11. After the tubes are thus constructed they are placed in a lathe and the strips are cored or milled to provide a perfectly straight and even diameter throughout the length of the tube, which diameter is, of course, of a size to snugly fit the torpedo. By this construction the tubes present much less frictional surface to the torpedoes, and, as no part of the torpedo comes in contact with the interior of the tubes, it is unnecessary to finish said interior. The tubes cannot be incapacitated through being dented or similarly injured, as may happen in various ways.

Held in a space above the top of the hull, and in direct alignment with the after torpedo tubes, are the storage and loading tubes L, each of which is constructed with a vertical extension L^1, open at its upper end and extending through the superstructure of the vessel. The extensions are formed by the side plates L^2 extending tangentially from the circular body portion of the tubes and connected at their ends by end plates L^3 and L^4, which are also secured to the circular body portion of the tube. The ends L^3 are preferably arranged upon an angle to provide an upwardly tapering throat, facilitating the insertion of the torpedoes in the tubes L, as seen in Fig. 4. The opening of the extension of each tube is closed by a hatch plate L^5, which is bolted down to the superstructure. Each of the said tubes is also provided with guide strips L^6, preferably of wood and held in dovetailed grooved metal strips L^7, as shown in Fig. 10, held in the bottom and sides of the tube.

In the fore part of the space formed by the superstructure and in longitudinal alignment with the storage and loading tubes L, and the fore and aft firing tubes, are storage tubes M, having guide strips similar to those of the tubes L. The inner end of each storage tube M projects into the conning tower and is closed by a cap M^1, preferably screwed in place, and which prevents ingress of water to the conning tower, should a leak occur through either of the hatches H and H^1, or hatch covering the opening of the loading tubes.

The torpedoes are first lowered into each of the loading and storage tubes L, Fig. 4, through the openings L^1, from which they are first pushed for-

Fig. 3.

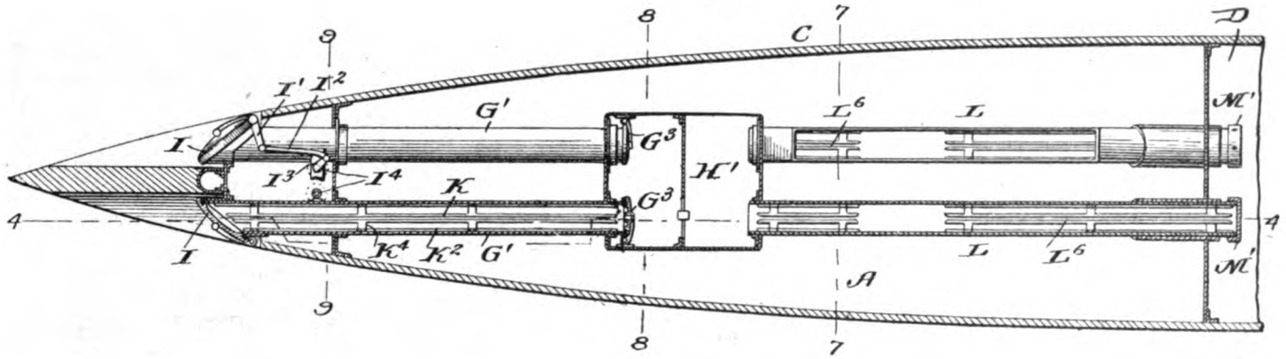


Fig. 4

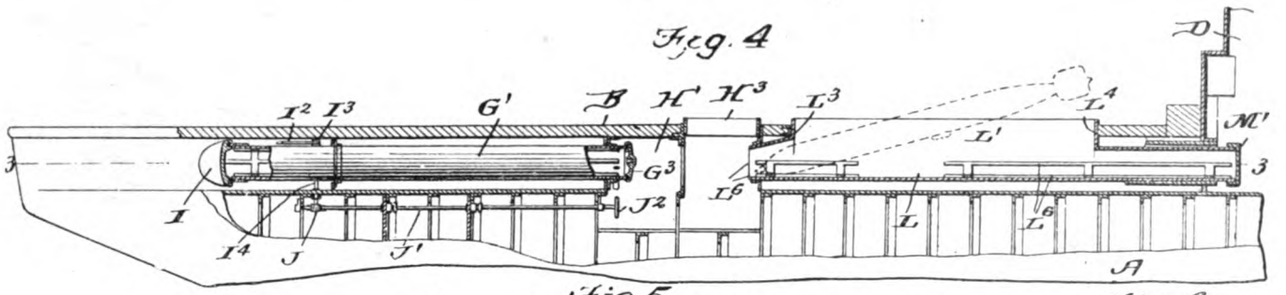


Fig. 5.

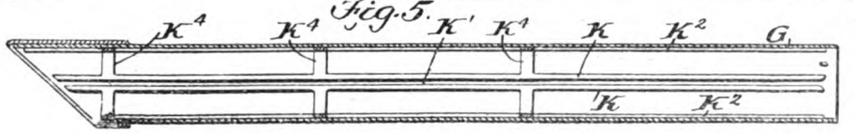


Fig. 6.

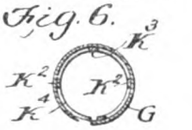


Fig. 7.

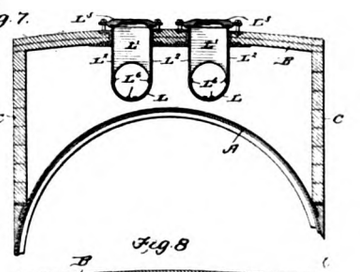


Fig. 8

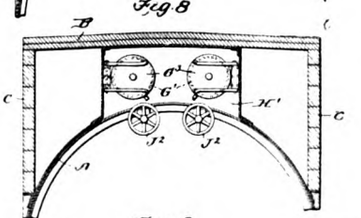


Fig. 9

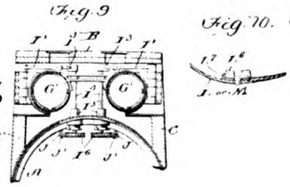


Fig. 11.

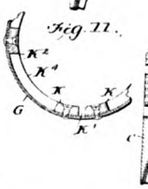


Fig. 10.

wardly through the tubes into the tubes M, and thence into the firing tubes in the fore part of the vessel. Other torpedoes are then lowered and moved rearwardly into the after firing tubes, and finally the last torpedoes are lowered into and allowed to remain in the loading and storage tubes, the operation being exceedingly simple and, it is claimed, brief in accomplishment.

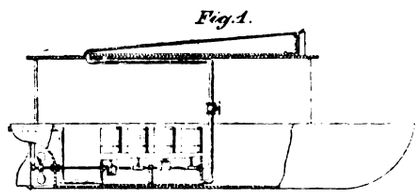
The torpedoes in the after tubes are examined in the rear hatch by first withdrawing the torpedoes in the loading and storage tubes into the conning tower, and then by opening the inner caps of the after tubes, the torpedoes may be withdrawn and their rear ends inserted into the loading and storage tubes and examined as they are moved forwardly into the tubes, after which they are replaced and the torpedoes previously withdrawn from the storage tubes into the conning tower are replaced, having in the meantime been examined in the conning tower. This operation is also performed with respect to torpedoes carried in the forward tubes. When a torpedo has been discharged another may be readily inserted in its place from the storage tube, held in longitudinal alignment with the tube from which the torpedo has been discharged.

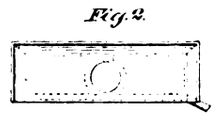
While the construction and arrangement of firing and storage tubes are shown, the details of the firing mechanism and means of securing the tubes in position are omitted, as any suitable method may be employed, the inventor making no claim to such details.

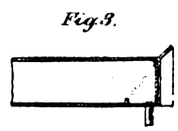
VENTILATOR FOR MOTOR BOATS.

The accompanying illustrations show a combination protective awning and engine cooling apparatus for motor boats. The distinguishing feature of this invention is an overhead air scoop, open at the forward end and closed at the after end, said air scoop being connected by a suitable conduit with the motor crank chamber when the boat is propelled forward. As a result, not only is the roof kept cool, but also the motor crank chamber, the latter being ventilated and having all objectionable odors carried off.

Fig. 1 is a sectional view of a motor boat showing the apparatus in position. Fig. 2 shows a front elevation, on a larger scale, of the air scoop, and Fig. 3 a larger sectional view of the scoop. The motor boat may be of any construction, provided with kerosene or hydro-carbon motors having the cranks enclosed in a common chamber, said chamber being sealed with the exception of the air inlet and outlet conduits. This inlet conduit connects with the rear portion of the air scoop, the outlet discharging to the atmosphere. The top of the scoop is preferably though not necessarily convergent, its rear being closed and its forward end being closed in part by a dashboard in which is formed an inlet aperture, preferably circular, this aperture being closed,







except when the boat is propelled forward, by a flapper or door hinged to swing inward. A gutter extends across the floor of the scoop, or air receiver, for the purpose of collecting and disposing through a drain of any water resulting from rain or snow admitted through the opening. The inlet conduit is provided with a valve for regulating the flow of air to the crank chamber.

The inventor is Abbot Augustus Low, St. Lawrence county, N. Y.

FEED WATER HEATING.

Marine engineers will be interested to note the publication of a new and complete catalog of steam specialties by the Griscom-Spencer Co. of 90 West street, New York City, formerly the James Reilly Repair & Supply Co.

Probably few names are better known in connection with the manufacture of marine feed water heaters than that of the Reilly Co.

The Reilly multicoil feed water heater is one of the best known feed water heaters in the United States and has for many years been regarded as such on the Atlantic seaboard. Its introduction into the great lakes district has been more recent, but such installations as have been made have shown the same remarkably high efficiency and the heater is arousing much attention among the lake engineers, where hitherto the straight tube heaters have been in general use. The catalog explains in detail the scientific theory embodied in the use of a large number of small-diameter copper tubes, coiled helically on a small radius, whereby the violent agitation so necessary to the efficient and rapid absorption of heat in a closed heater is secured in the highest degree.

This catalog is of more than usual interest and value by reason of the rules and tables it contains, showing the calculations and results to be secured from the installation of feed water heaters. These tables are figured for several different kinds of steam plants, for different values of coal and for various initial temperatures of feed and show the remarkable yearly cash savings per horsepower of main engines effected by the use of heaters. The catalog also contains an interesting discussion of the various phases of the feed water question and the information will be of much value to any engineer as a guide for determining the selection of the feed water heaters.

The catalog also describes briefly the other well-known specialties of the Griscom-Spencer Co.

The Reilly multicoil evaporator is designed especially for use on shipboard for distilling sea water, for drinking purposes, and for makeup boiler feed.

The Reilly multicoil condenser, to be used in conjunction with the evaporator.

The Reilly water filter for rendering distilled water sweet and palatable.

The Reilly grease extractor feed water purifier and filter for removing oil, grease and other impurities from feed water.

The catalog is elaborately illustrated with half tones and diagrams. Copies will be sent upon request.

Maj. J. C. Sanford, government engineer, 815 Witherspoon building, Philadelphia, opened bids a few days ago for constructing a steel, twin-screw suction dredge for Galveston harbor. The bidders were: Maryland Steel Co., Sparrow Point, Md., $357,500, delivery in nine months; Fore River Ship Building Co., Quincy, Mass., $384,500, delivery 9 months, 15 days; New York Ship Building Co., Camden, N. J., $410,000, delivery 12 months; Newport News Ship Building & Dry Dock Co., Newport News, Va., $412,000, delivery in 11 months; Wm. Cramp & Sons, Philadelphia, $499,500, delivery in 12 months.

STAYBOLTS.

Editor MARINE REVIEW:—The safest and most effective staying for locomotive and marine boilers is a subject of the highest importance. The frequent discussions and conflicting opinions advanced from time to time as to best methods are evidence that there is no well settled or uniform plan adopted for this important feature of boiler construction.

While it is agreed that metal of high quality and vibratory power is necessary there seems no unity of thought as to best design of staybolt that would come nearest to the qualities of safety, economy and endurance.

The strenuous service, the prevailing necessity of rapid heating and cooling of boilers causing extremes of temperature, the adoption of high pressures and the frequent failures of the constructive parts often followed by serious results should attract to the subject deepest thought and attention.

Staybolts have a diversified mission. To the tensile strain used in sustaining the firebox sheets in normal position is added irregular bonding forces due to expansion and contraction. The outer ends of solid staybolts are usually in a heat of less than 300 degrees, while the inner ends are struggling in a temperature between 700 and 800 degrees F. Torsional strains are also very often in evidence due to untrue alignment of holes and thus we obtain from the first day in service, forces bordering on dangerous fatigue of the metal.

However, premature or early breakage is often directly due to impure metal or metal not sufficiently cohesive to long endure the frequent reversal of forces. It is quite evident that to obtain reasonable endurance, iron suitable for staybolts must receive special attention in manufacture. The solid staybolt as usually introduced is far from being safe or satisfactory. Breakages at best are frequent and unless well covered by regular, capable and experienced inspection, they become a hidden source of danger. We should also remember that while hammer sounding is somewhat assuring, it sometimes fails to detect those actually broken, and the sound test is never certain to discover bolts partially broken.

The latter at times are numerous and form an unsuspected danger. The truth of this will be apparent to any one making an inspection of the staybolts on exploded sheets. It can likewise be seen on firebox sheets removed because of being crooked or bulged.

Drilling telltale holes into the outer ends of solid staybolts offers neither safety nor economy. The purpose (self warners when broken) it is true is desirable, but they fall short of expectations. The drilling process, when well done, forms a weakness in the stay at a point where much strength and flexibility is required, but when the drill is run off on an angle or not held in line with the center of the metal, the reduction in strength becomes serious. The telltale or blind holes often fill with dirt so hard that the self-warning feature becomes nil.

Some object to telltale drilling because of the inconvenience to do the work, the time it takes and the labor and expense involved. The writer's experience is to the effect that while the expense is important it is as nothing compared to the resultant weakness due to drilling followed by breakages, delays to equipment and expense of replacements.

Considerable thought and attention is now given to flexible staybolts. The principle at first sight strikes one as having considerable merit, but on deeper thought the flexible action, under service conditions, will be found not only impossible, but it also involves some serious objections.

The inside end of the flexible is attached to the fire sheet in the usual way, the outer end of the bolt with round head resting in a prepared sleeve of corresponding lines, the whole covered by a screwed-in cap. The purpose of the inventor is to the effect that the apparent loose attachment of the head to the outer sheet would respond freely to expansion and contraction movement of the inner ends without causing any vibratory strains on the body of the bolt. This, however, is an appeal to theory and does not in practice bear out expectations.

The failure of the flexible action of the head and the consequent breakages just under the head, is due principally to the immense friction between it and the sleeve brought about by the constant strain of the stay in supporting the sheets. In other words if the bolt is to be of any use as a stay between sheets, its grip at the ends deprives it of any flexibility other than that obtained by the vibratory action on the body of the bolt. Under the conditions it is as rigid and liable to break as the ordinary solid staybolts, and if the flexible develops any marked endurance as compared with the solid, it is due to a superior quality of metal, nothing else.

The attention of the writer was called to the use of hollow staybolts. The bars, from which these bolts are made, have a central hole formed by being rolled in the center. This practice assures solidity, increases tensile strength, and high elasticity of the metal and prevents any possible defective welds, all being qualities necessary to endurance in staybolt service.

Having had some prior experience with the hollow bars made in this manner, and being troubled with broken staybolts on several mountain engines, due to variation of pressure followed by extremes of temperature several times a day, the undersigned had some hollow staybolts placed on surfaces giving the most trouble from broken bolts, and as the solid and those having drilled telltales were removed, they were replaced by hollow. After about a year of this practice, it was noticed that the staybolt work at the short run terminals was very materially reduced. Prior to this, the life of the solid stay with telltale drilling was between five and nine months, depending on location in staying, while after this time, a little over a year, no record of a single hollow bolt being broken, although being located mostly in what was considered the breaking zone. Longer periods of experience with the hollow bolt developed equally good results, the endurance of the hollow being remarkable under the severe conditions existing.

The great endurance shown by the hollow staybolts is attributed to several causes. The method of rolling both at the center and outside of the bars creates a substantial unity of the metal, assures freedom from improper welds, the pure and high quality of the metal, forming the base from which the bars are rolled, tends to both strength and elasticity, the very qualities required to endure continued reversal of strains, longer than iron manufactured under ordinary methods.

The self-warning principle of the hollow staybolt is highly appreciated by those directly in touch with the power. Eliminating the hammer tests, together with the feeling that no dangerous number can be broken without compelling attention, is regarded as a very satisfactory condition, as it is a positive assurance against boiler explosions or other troubles due to broken staybolts.

It is well known that the strength of wrought iron decreases after reaching 350 degrees F. Moderately high firebox temperature causes solid staybolts to reach the depreciative heat, this being one of the causes which shortens its life. With the hollow staybolts in service, a streamlet of cool air passes through each bolt to the furnace, thus holding the metal at a lower temperature, rendering both strength and endurance that cannot be obtained with the use of the highest possible grade of iron in the solid staybolt.

The greater endurance of the inner ends of the hollow bolts as compared to the solid, is very noticeable. This is due to the inrushing oxygen through the hollow, cooling the ends of the bolts and reducing the waste of the iron due to the high heat of the fire.

On engines, whose fireboxes were fully equipped with hollow stays, some fault was found because it was thought too much cool air was entering the furnace, while there was some doubt of this by those who had watched the matter closely, yet it was thought best to reduce the center holes from 3/16 in. to ⅛ in., which was done. The amount of oxygen supplied through the ⅛-in. openings, seemed to be sufficient to consume the gases and the assistance to combustion was quite apparent.

It is said that a few have closed the center holes at the inner ends of the hollow stays with a couple of blows of the hammer, claiming the entrance of too much cold air. This practice, I am certain, should be discouraged. In order to obtain full benefits from the hollow, the air should be permitted to pass through a ⅛-in. hole to the fire. This will hold the staybolt to lower temperature, add to its strength and flexibility, cause greater endurance to the inner ends, and while aiding combustion will add noticeably to the efficiency of the furnace, and afford a double advantage for the detection of breakages, should any occur, as the annular hole passes through the bolt entire, and failure at any point will immediately make itself known.

Hollow stays with both ends open will never stop up, as the current of air passing through them always keeps the holes free from sediment. Furthermore, the hollow bolt saves material and time in application and renewals, and also prevents injury to sheets in making renewals, as the operator has a central hole for his drill to follow.

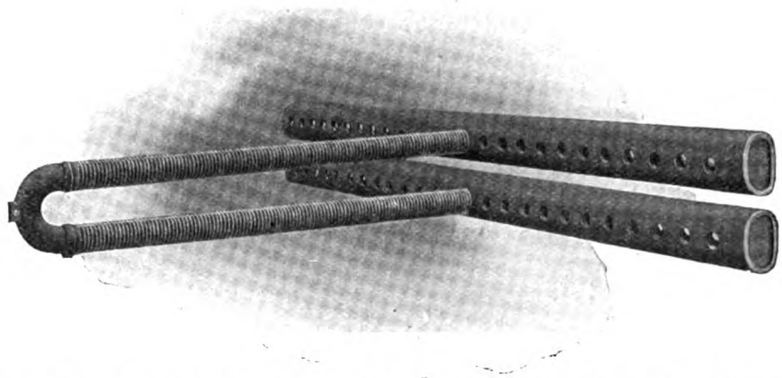
We seem slow to realize, but it is no less a fact, that almost daily in some part of the country, broken staybolts are responsible for waste of property, for injury to persons, and for destruction to life.

JOHN HICKEY.

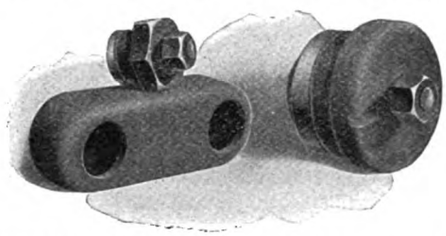
Salt Lake City, Dec. 23, 1907.

FOSTER PATENT SUPERHEATER.

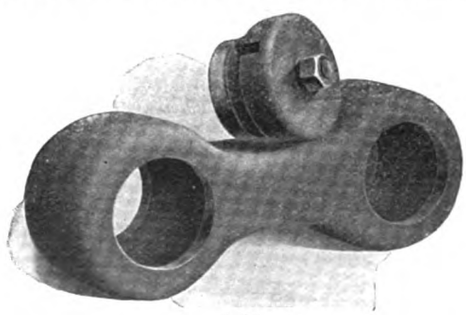
It is only in recent years that steam engine and turbine construction has advanced to the point where there are no drawbacks to the use of superheat, though the advantages of superheating have been recognized for over 50 years. With the innovation of metallic packing, mineral oils for lubrication and other improvements incidental to good practice, engineers are again adopting the use of the superheater, and, while a few years ago the superheater installations in this country were rare, a fair estimate of superheaters now in use or under construction would be considerably over a million horsepower, taken on the basis of 30 pounds of steam hourly per horsepower. The construction of superheaters has greatly improved both in design and material. The many defects of the old types—unequal distribution, lack of provision for free expansion and contraction, inaccessibility for inspection or repairs, etc.—have been in turn studied out and remedied. Boilers not designed for high pressure may be fitted with superheaters, making it possible to obtain a high temperature at a low pressure, and adding immeasurably to the element



ONE PROTECTED RETURN ELEMENT OF FOSTER SUPERHEATER, SHOWING INLET AND OUTLET HEADERS.



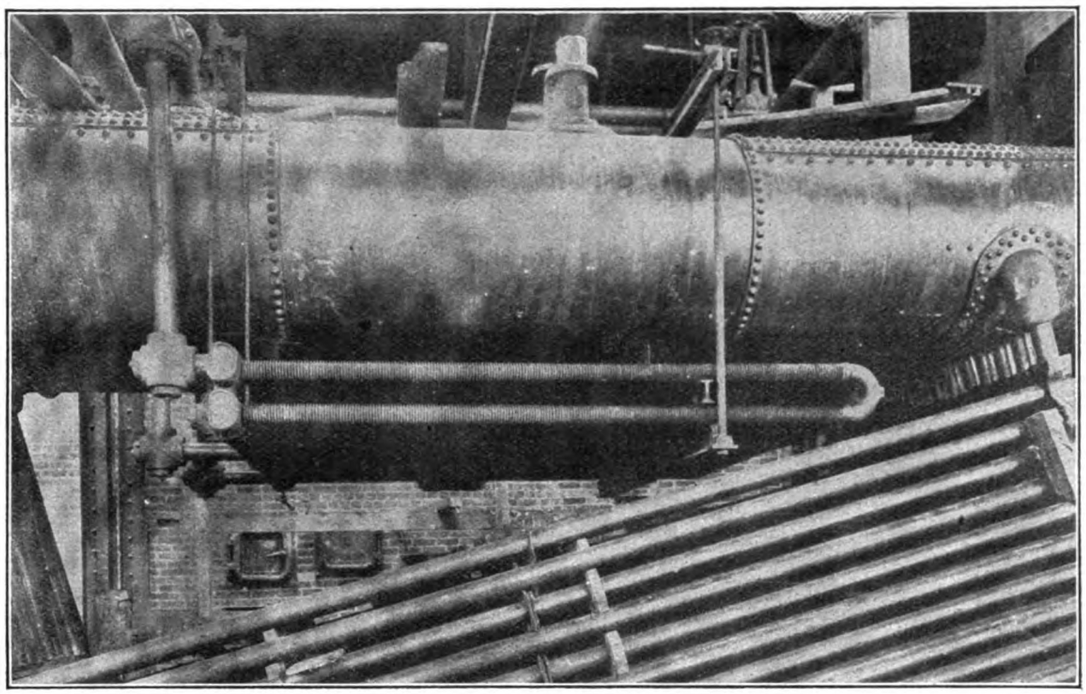
TWO-INCH STEEL RETURN HEADER; 2-IN. AND 4-IN. SPECIAL HAND HOLE PLUGS COMPLETE USED IN CONSTRUCTION OF FOSTER SUPERHEATERS.



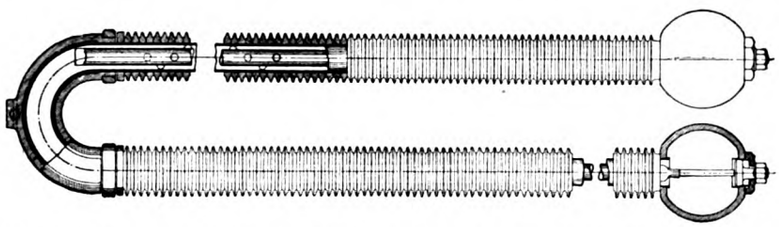
STEEL RETURN HEADER; SPECIAL HAND HOLE PLUG AND CAP USED IN CONSTRUCTION OF FOSTER SUPERHEATERS.

of safety. Old boilers may also be fitted, and, though weakened by use, rendered serviceable at moderate cost and without the waste of time and inconvenience incident to renewal.

The Foster patent superheater, manufactured by the Power Specialty Co., is the outcome of careful research into the various designs and records of performance of superheaters for the past 50 years, combined with considerable experience in superheater designing and construction. As will be observed from the illustrations, it consists of a series of straight elements or tubes, generally placed parallel to each other, these elements being joined at one end to manifolds, or connecting headers, the other end being connected to return headers, for which return bends are often substituted. The design of the elements is a radical departure from the usual type, being built of straight, seamless, drawn steel tubes encased in a series of cast iron annular gills or flanges. These gills are faced to fit close together on the tube, and are also fitted to the tube so as to be practically integral with it, being bored to gage and shrunk on the tube. Inside of the tubes or elements are placed other tubes of wrought iron, these internal tubes being centrally supported by means of knobs or buttons regularly spaced throughout their length, and having their ends closed. This arrangement necessitates the passage of the steam through the space thus formed between the inner and outer tubes, forced contact with the heating surface raising the steam to a high degree of efficiency.



FOSTER SUPERHEATERS IN BABCOCK & WILCOX BOILERS AT THE POWER PLANT OF THE N. Y., N. H. & H. R. R. CO. AT READVILLE, MASS.



CROSS SECTIONAL VIEW OF RETURN BEND ELEMENT AND CONNECTING HEADERS USED IN THE CONSTRUCTION OF FOSTER SUPERHEATERS.

By reinforcing the seamless drawn tube with cast iron gills or flanges, greater strength is not only obtained and protection afforded the steel tube, but the mass of metal in the tubes and covering acts as a reservoir for heat, imparting it to the steam evenly and securing a constant temperature in spite of fluctuations in the temperature of the hot gases. This form of construction provides a section of great ultimate strength and entire freedom from internal strains, and has proved most durable. The joints at the end of the elements are made by expanding the steel tube into headers of wrought steel, except in special cases where cast steel is preferable.

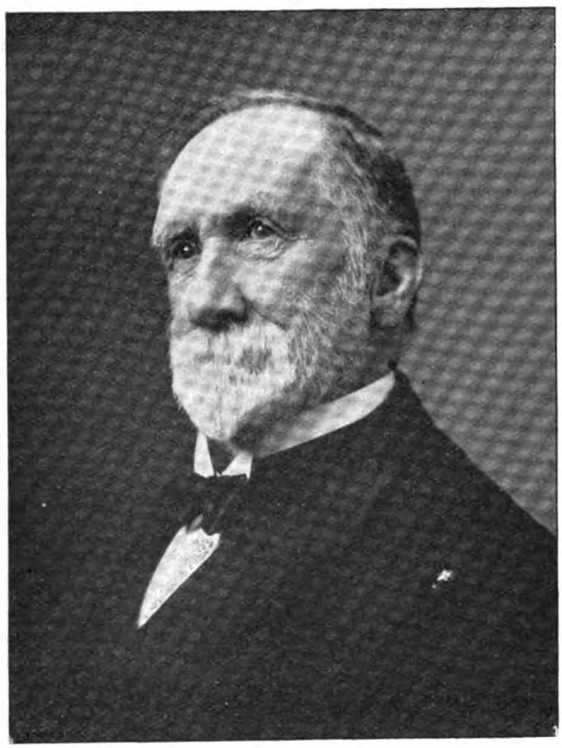
The Foster superheater is designed with a view to avoiding the necessity for flooding devices or any form of connection between the water space of the boiler and the superheater, the protection afforded by the external covering of cast iron being ample to prevent damage to the surface during the process of steam raising, or at other times.

As by this form of construction great flexibility of design is permissible, any type of boiler or steam plant can be equipped with the Foster patent superheater, the installation being made either in the fire space, combustion chamber or uptakes, as may be considered most advisable from a point of efficiency and convenience.

Oliver Reeder & Son, Baltimore, Md., launched the tug Howard Reeder, Feb. 8. She is building to the order of Capt. Charles W. Lewis and is designed for harbor work, being 78 ft. long, 18 ft. beam and 8 ft. deep.

NICHOLSON SHIP LOG.

The Nicholson Ship Log Co. is issuing a handsome booklet containing much interesting information and other matter on the Nicholson recording ship log, speed indicator, and other nautical measuring devices, the inventions of Ezra Nicholson, of Cleveland. To the master or owner desirous of retaining records of the speed of the vessel throughout the entire trip the recording ship log is peculiarly adapted. A chart, having the hours laid off vertically and the miles horizontally, is mounted on a drum placed under the speed indicating dials. This drum shows a complete record of the speed for 24 hours, and can be arranged to revolve in 8 or 12 hours, if so desired, thereby allowing from two to three times the space between hours. These records can be dated and filed for future reference in the office of the shipping company, as is being done in a number of lines using the Nicholson recording ship log, the log in some instances having paid for itself many times over in preventing damage suits for alleged excessive speeds in dangerous passages.



MR. EZRA NICHOLSON.

The compactness of the instrument should appeal to the navigator, a clock, counter, two speed indicating dials and the recording chart being centralized in a mahogany case 31 in. in height, 20 in. in width and 9 in. deep. Fig. 1 illustrates the recording log as installed aboardship, showing the registering apparatus complete. The clock works in conjunction with the speed dial and regulates the counter and record drum. On the dial to the left is indicated the miles or knots per hour at which the vessel is moving, the pointer being operated by the vessel's speed. The pointer on the dial to the right works in connection with the counter and shows the fractions of miles or knots. When it completes a revolution, a figure is turned in the counter placed between the dials.

Fig. 2 shows a cross section of a vessel with the log installed in the pilot house and connections to the seacocks through which the water operates the instrument. A is a 1¼-in. plug cock having a stuffing box, F, attached thereto. The intake tube, B, is 1 1/16 in. outside diameter and slides through the seacock, protruding about 3 in. from the ship. The bottom end of this tube is plugged and the hole, D, bored in the side, making it answer as an elbow. This hole faces the bow of the ship and is held in place by the handle, H, and crutch G. The connection, I, is screwed into the top of the intake tube, from which 3 ft. of strong ¾ hose leads to the controlling cock, L. This hose allows the intake tube to be raised or lowered. If the tube should become bent from striking an obstruction, a most remote possibility, the connection, I, and handle, H, can easily be removed, the tube pushed out, and a new one inserted.

When the ship is at rest, both floats, S S, in pipes, Q and X, known as the speed pipe and load level pipe respectively, will remain at the water line, always keeping the registering apparatus at zero, regardless of any change of load. As the ship moves forward the water enters the intake tube at the hole, B, and flows into the speed pipe, raising the water column according to the rate of speed. When the ship has reached her normal speed, the float, S, comes to rest and does not change unless the speed is increased or diminished, returning to the load line when the vessel is

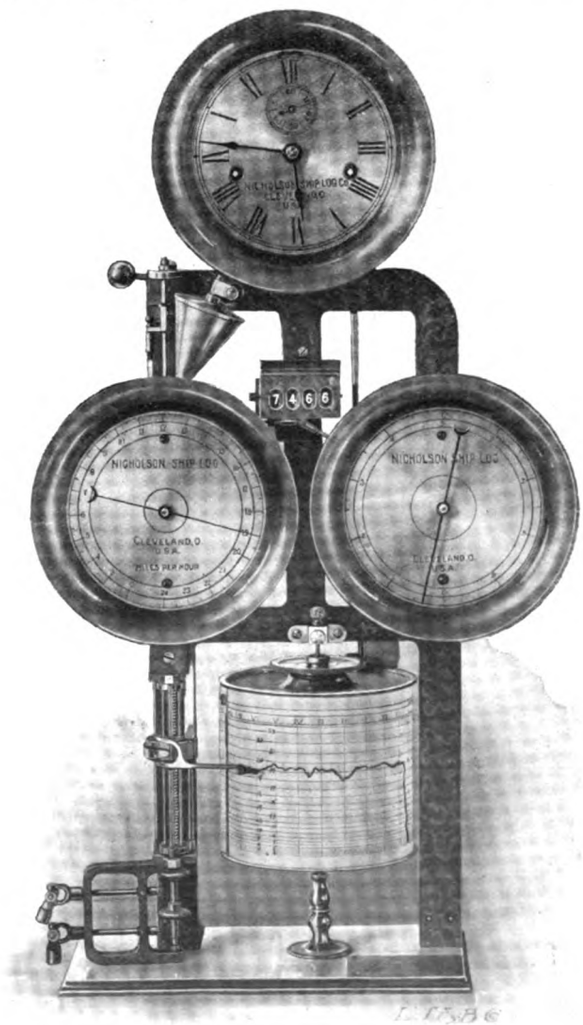


FIG. 1.

stopped. To the float shown in pipe, Q, is attached a chain which runs over sprocket wheels, E, in the pilot house. To the end of this chain is attached a counterweight encased in a ¾-in. iron pipe. Connecting the log with the sprocket wheels, E, are the ¼-in. brass shafts, M.

The recording ship log is applicable to any style of vessel, and is usually installed in the pilot house, chart room

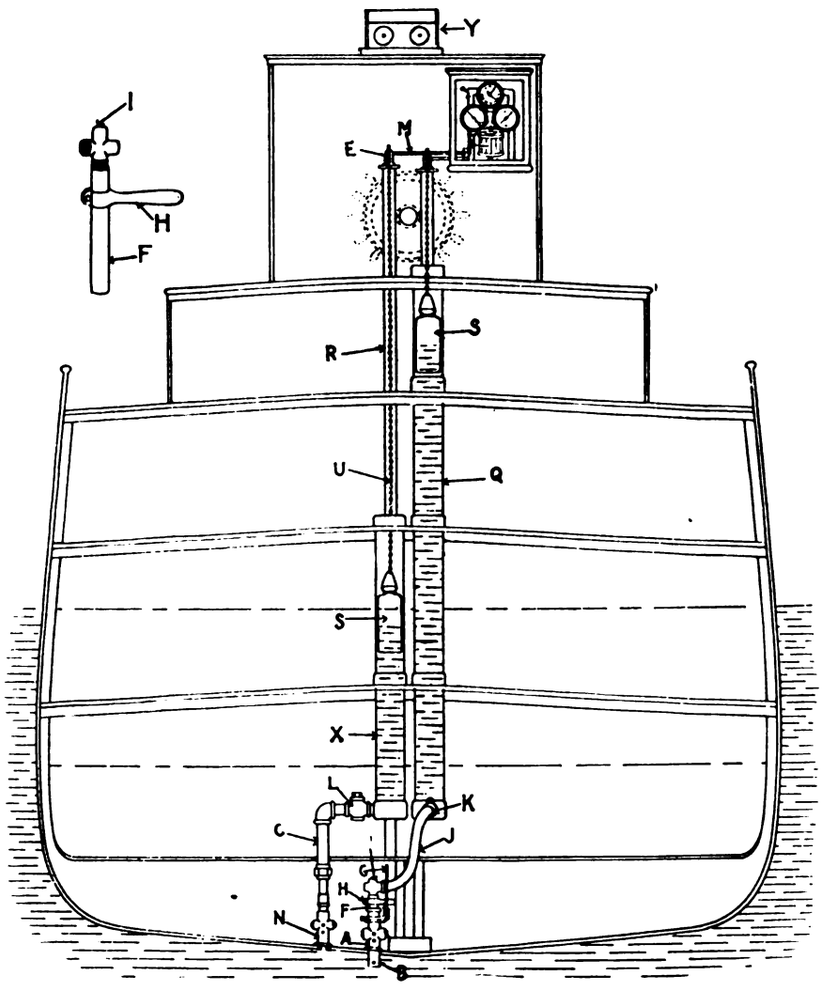


FIG. 2.

or bridge, where it can be readily seen at all times. Beyond the daily winding of the clock and changing of the record chart the apparatus requires very little attention, and is entirely automatic in its action. Provision has been made for any obstruction which might arise through the choking or other injury of the exposed pipe. There is nothing in the construction of the log to interfere with the action of the compass.

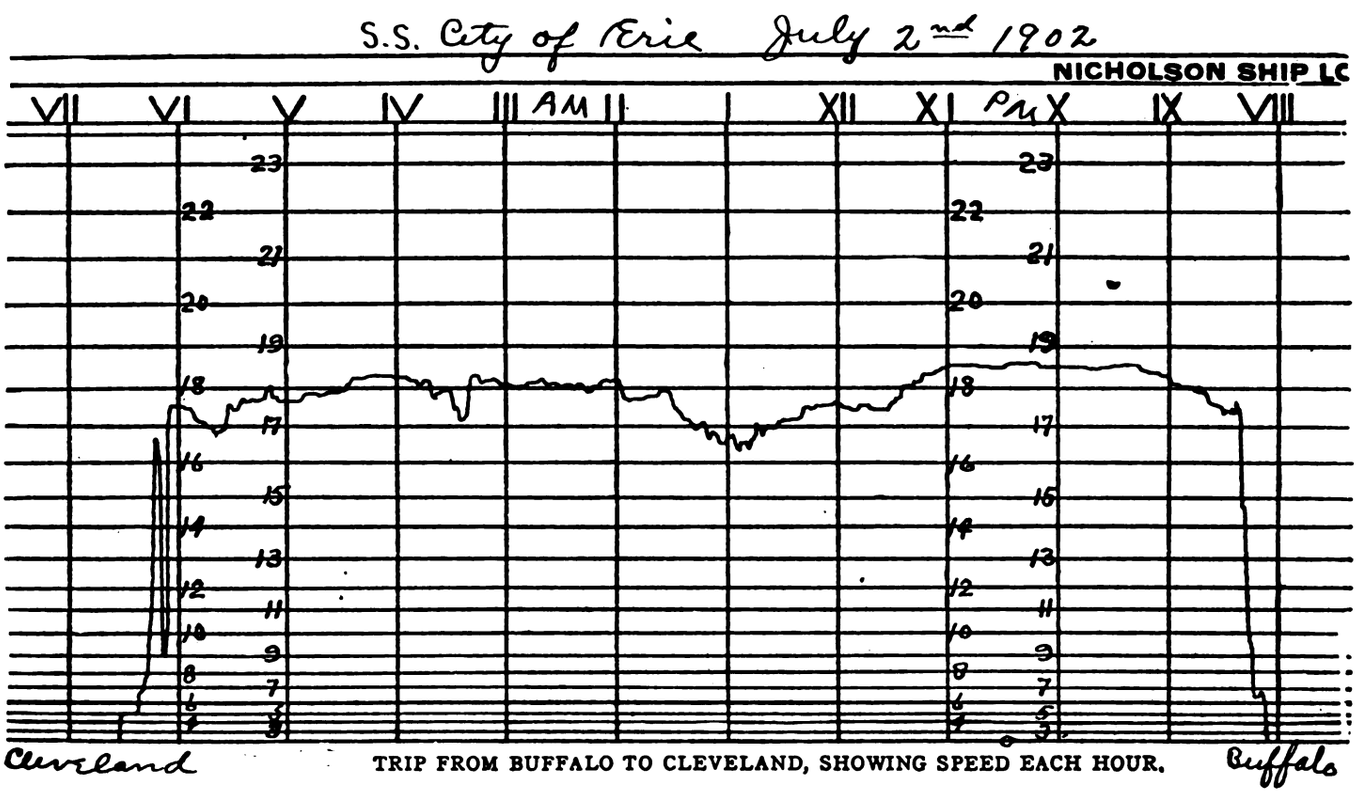
The offices of the Nicholson Ship Log Co. are in Cleveland, O., the eastern agents being Barrett & Lawrence, 662 Bullitt building, Philadelphia, Pa.

JOHN HARVARD BILES, LL.D.

A BIOGRAPHICAL SKETCH.

(From *Cassier's Magazine.*)

Amongst the prominent men in naval architecture, probably no name is better known than that of Prof. J. H. Biles, vice president of the Institute of Naval Architects. His association with ship building dates back to the time when wooden ships were still being built for the Royal navy, when wooden ships were being protected with armor, and when iron armorclads were experiments. He began practical work on a wooden ship in Portsmouth dock yard, but spent the greater part of his apprenticeship on the building of H. M. S. Devastation, the first battleship deliberately constructed without sails, a vessel designed by Sir E. J. Reed, into whose shoes he has since stepped as consulting naval architect to the India office. Passing on to the Royal School of Naval Architecture, at South Kensington, and the Royal Naval College, at Greenwich, he was graduated first of his year, and was appointed a junior on the construction of the cruisers Iris and Mercury at Pembroke. These vessels were the first to be made of the present-day mild steel, and it is not too much to say that their successful construction was the beginning of a complete reconstruction of vessels for the mercantile marine. While they were building they were alone in having that steel. Within 10 years the use of iron as the main structural material of ships had been completely abandoned. From the construction of these steel ships in Pembroke dock yard to the manufacture of the material in the Landore Steel Works was an interesting and useful change in his experience, bringing him into contact with the most advanced steel metallurgists and manufacturers. From there he passed to the Admiralty office, assisting in warship design and special scientific inquiry, including the series of turning trials of H. M. S. Thunderer made for the Inflexible committee under the direction of Sir Philip Watts. In 1880 Mr. Biles accepted an invitation to become naval architect to the Clydebank ship building firm now known as John Brown & Co. His studies in the resistance of ships while at the Admiralty led him to change very considerably the practice as to forms and dimensions of merchant ships which had made the Clydebank firm famous. The Servia was then building for the Cunard company, having dimensions 515 ft. by 51 ft., and 10 beams in length. A duplicate was being inquired for by the owners, but they were persuaded to adopt Professor Biles' proposal of a vessel 470 ft. long by 57 ft. beam, of eight beams, but of finer form. Such extravagance in beam was generally condemned, but the result showed that a higher efficiency followed. The same innovation was applied in many other types of vessels, one of the most notable being the America, built for the National company, to compete with the existing Atlantic ships of that time. This vessel averaged the same speed as the fastest existing ships for 20 per cent less power and coal consumption. She was the forerunner of the New York and Paris, the first fast passenger twin-screw Atlantic vessels. The contract for these vessels was placed in 1887, and they are running successfully today. Their under-water form is practically identically the same as that adopted for the Lusitania and Mauretania, which was selected for them after a most extensive series of experiments had been made in the Admiralty and other testing tanks. The New York and Paris embodied the first attempt at complete sub-division, i. e., complete watertight bulkheads with no doors, as Professor Biles believed that doors in a bulkhead were a danger. The value of this sub-division has been



TRIP FROM BUFFALO TO CLEVELAND, SHOWING SPEED EACH HOUR.

more than once shown in cases of emergency in these ships, and the fact that the Dreadnought and all later battleships and cruisers have the same system is some indication of the progressive nature of the work done by Professor Biles at Clydebank.

The warship side of naval construction had been equally interesting him during this period. The first torpedo boat destroyer, Destructor, was designed by him, and many valuable features were introduced to increase safety and speed. This vessel did a passage from Falmouth to Finisterre at a speed of 20 knots, which, though it happened 20 years ago, has seldom, if ever, been equalled by a destroyer. The cruiser Reina Regente, designed by him at that time, was the fastest of her day—in fact, the first cruiser to exceed 20 knots in speed. Her sub-division was very extensive and her armament and protection greater than any ship of her time and class.

One of the most successful of the earlier intermediate steamers was the Friesland. She attained a trial trip speed of 14½ knots, fully laden, and averaged for many years 15 knots across the Atlantic on a very moderate coal consumption.

During the time he was at Clydebank Mr. Biles contributed many papers to the Institution of Naval Architects on various scientific and practical subjects, and was elected to the council of that institution, upon which he has remained ever since. Later, he was elected a vice president, and has taken a very active interest in the management of that institution.

After having been at Clydebank for 10 years Mr. Biles was appointed professor of naval architecture at Glasgow university. Students of naval architecture come from all parts of the world to take the courses of lectures in that famous Scottish seat of learning. During the last session American, Japanese, Chinese, German, Scandinavian, Russian, Austrian, Roumanian and British students formed a cosmopolitan gathering, united in the one object of learning naval architecture. Two Scotsmen headed the senior class in the finals, but this position has been taken, in turn, by many nationalities. The present chief constructor of the United States navy, Admiral Capps, was one of these graduates. Constructors Hibbs, Rock, Ruhn, Spear, Ferguson, Watt, Zahn, Powell, Evans, Robinson, besides many other Americans in private service, have been graduated at Glasgow. Also Yacht Designers Barbey, Stearns, Clinton, Crane and Wittlesea took the naval architecture courses. Professor Sadler, of Michigan university, was a graduate, and afterwards assistant to Professor Biles. W. Selkirk Owen, of New York, another graduate, occupies that position at present. Yale university has recognized the work of Professor Biles by giving him the degree of LL.D. Professor Terano, one of the staff of the naval architecture department of Tokyo university, headed his class at Glasgow university. Many other Japanese have distinguished themselves. Professor Biles was elected an honorary member of the Japanese Society of Naval Architects in 1903.

As professor, he has not been allowed to drop out of touch with the practical world, his services being retained as consulting naval architect by such companies as the L. & S. W. railway, the Midland railway, the American line, Union Steamship Co., of New Zealand; Great Northern Railway, of America, and others, for whom he has designed many steamers, now successfully running. His recent appointment as consulting naval architect to the India office, in succession to the late Sir E. J. Reed (formerly chief constructor of the navy), will give him a further field for the practical application of his scientific knowledge. The Admiralty have availed themselves of his professional skill in investigations on mercantile auxiliaries, the outcome of which inquiry was the Lusitania and Mauretania; the investigations of the strength of torpedo boat destroyers, on which occasion for the first time the absolute strength of a vessel was tested in dock, so that afterwards the amount of stress the sea brought upon the vessel could be determined; and latterly on the warship design committee, where, though its secrets have not yet been divulged, we do not doubt that he contributed his full share to the success of the vessels produced by that committee. He was a member of a committee on tonnage of ships in 1905 and 1906. One of Professor Biles' most interesting pieces of work was the devising and carrying

through the reconstruction of the Egyptian yacht Mahroussa, an iron paddle vessel built 40 years ago, but now an up-to-date turbine steamer. This work was entrusted to him by the Khedive, and as a mark of his highness's appreciation of the result, the order of the Osmanieh of the third class was conferred upon him. He is a prolific writer for scientific societies, his papers and speeches being known for their practical character. He published a series of lectures on "Steam Turbines" in book-form last year, and is on the point of publishing the first volume of the systematic treatise on naval architecture which he has been evolving from his regular lecture course.

His professional work has taken him to many parts of the world to advise or receive instructions in connection with designs of ships and other professional work. Japan, China and the United States of America have been many times visited. His first visit to the east was made in connection with new warships to be built for Japan soon after the China war, and he was afforded the fullest opportunity of seeing the results of gun-fire upon the ships that had taken part in the battle of the Yalu.

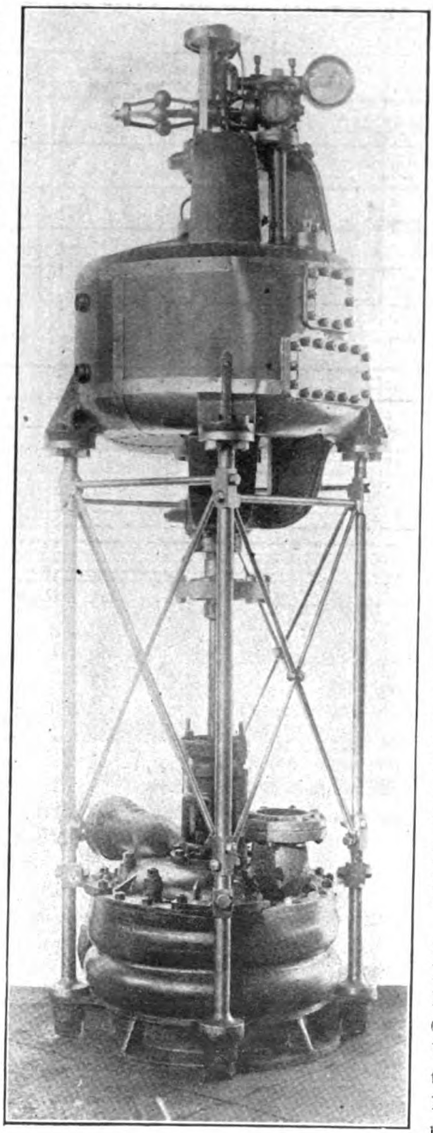
Professor Biles is a member of the Institution of Civil Engineers, member of the Institution of Mechanical Engineers, and member of the Society of Naval Architects and Marine Engineers, U. S. A.

TURBINE DRIVEN CENTRIFUGAL HOT WELL PUMP.

For the high vacuum required by steam turbines it has been found desirable, especially in large installations, to use separate pumps for drawing the condensed steam and the air from the condenser; forming what is known as the "Dry Vacuum System." The air is handled by an engine driven reciprocating air pump, and as no water is handled, the clearance can be made small, thus obtaining a high efficiency. The water is usually handled by a centrifugal hot well pump, which is drawn by an electric motor in the case of electric plants on shore, as it requires a high speed of rotation.

In using the dry vacuum system on turbine driven vessels it was considered objectionable to use a motor to drive the centrifugal hot well pump on account of the dampness and high temperature of the engine room; therefore direct drive by a steam turbine was used. The accompanying illustration shows the complete set as made by the Fore River Ship Building Co., for the United States scout cruiser Salem, the main propelling machinery of which consists of Curtis marine turbines.

The pump end consists of a 4-in. Worthington two-stage volute centrifugal pump arranged to work with shaft vertical. The turbine is a two-stage Curtis turbine mounted above



TURBINE-DRIVEN PUMP.

and directly connected to the pump.

The entire set requires floor space of only 3 ft. square and is 9 ft. 6 in. high over all. It is rated to deliver 300 gallons of water per minute from a 29-in. vacuum and has a large overload capacity. The total weight is 5,850 lbs. and speed is 1,200 R. P. M.

SAMSON BRAIDED CORD.

Solid braided cord is better than twisted cord for many purposes. It is smooth, hard and very durable and will not kink nor ravel like the twisted cord. The Samson brand is generally recognized to be the standard braided cord. It is made only of extra quality material and is guaranteed free from imperfections of braid or finish. Cotton is the material generally called for, although it is also made in linen and Italian hemp. For halliards a soft braid cord is sometimes furnished, but the hard braid will wear longer and its use is recommended wherever the stiffness is not objectionable. For log lines the Samson lines are standard. For this purpose it is very important that the best grade of cord should be used, as often an expensive log is at risk. For tiller rope on motor boats a wire cable center cord is generally used, which does not stretch and at the same time is very durable and easy for the hand to grasp. The Samson Cordage Works of Boston, Mass., who are the manufacturers of the Samson cord, make all kinds of braided cordage and are glad to send samples, catalog and information on request.

SOME DISTANCES ROUND THE WORLD.

BY WALTER J. BALLARD.

According to "Transportation Routes and Systems of the World," prepared by the bureau of statistics of the department of commerce and labor, the distance around the world via the trans-Siberian and our own trans-continental railway lines is shown to be 17,997 miles, being, from New York to St. Petersburg, 4,362 miles; from St. Petersburg to Vladivostock, 5,809 miles; from Vladivostock to Port Townsend, 4,357 miles, and from Port Townsend to New York, 3,199 miles.

The sailing distance around the world from New York via Suez, Singapore, Manila, Guam, Hawaii territory, and the Panama canal to New York again is 23,692 miles; being in detail, from New York to Singapore, 10,170 miles; thence to Manila, 1,386 miles; thence to Guam, 1,506 miles; thence to Hawaii, 3,337 miles; thence to Panama, 4,665, and thence to New York, 2,028 miles.

Information from San Francisco is to the effect that the Western Pacific Co. expects to have in operation a new ferry system in San Francisco Bay in competition with the Southern Pacific Co. It is understood that bids will be shortly solicited for the building of two modern ferry steamers, a freight boat and a number of tugs and barges.

The V. P. Baham Ship Yard, Madisonville, La., has been awarded contract by the Bradford Transportation Co., New Orleans, La., for the building of a steamer for the Lower Terrebonne trade.

TRADE NOTES.

Jenkins Bros., 71 John street, New York, have just issued a supplement to their latest catalog, giving description and list prices of Jenkins Bros. extra heavy and medium pressure grade valves.

The Smooth-on Manufacturing Co., Jersey City, N. J., has just issued a booklet called "History." It is just a little folder and gives the history of the development of Smooth-On cements.

The Smooth-On Manufacturing Co., Jersey City, N. J., has opened offices at 61-69 North Jefferson street, Chicago, 20 Sacramento street, San Francisco, and at 8 White street, Moorefields, London, E. C., England.

Wm. Porter's Sons Co., 17-27 Vandewater street, New York, have just issued a little folder announcing that they are more fully equipped and better qualified than ever to supply the trade with all kinds of marine lamp apparatus, carrying a full line of fixtures for oil and electric lighting.

The Billmeyer Lumber Co., Cumberland, Md., have just sent out a very useful office calendar for 1908. The figures on the calendar are of such size that they can be read at a great distance, and are printed in black ink, with red ink numerals to indicate Sundays and legal holidays throughout the year.

Benjamin Varnum How, 106 Tremont street, Boston, Mass., has just issued a little booklet on the Improved Arbecam Alidade which is being manufactured by E. S. Ritchie, Brookline, Mass. This instrument has been greatly improved since 1907. It has been examined by many nautical men of wide experience and has been much simplified and additions made that have added greatly to its efficiency.

The Detroit Seamless Steel Tube Co., Detroit, Mich., is installing additional machinery to make larger sizes of their Detroit cold-drawn seamless steel mechanical tubes. The demand for Detroit tubing has grown rapidly and the additional equipment will enable the company to increase its output materially.

The Wile Power Gas Co. have removed their general offices from Cutler building, Rochester, N. Y., to its works, 1688-92 Columbus road, Cleveland, where all communications in future for complete gas power plants, including gas engines and gas producers for gas power and fuel purposes, should be addressed.

The Under-Feed Stoker Co. of America, 834 Marquette building, Chicago, have recently issued two bulletins descriptive of the installation of the Jones stoker upon the freighter Eugene Zimmerman of the Toledo Steamship Co.'s fleet and upon the coastwise steamer Ossabaw of the Brunswick Steamship Co.'s fleet. The installation has in each case resulted in a saving of fuel, as well as in the economical use of a cheaper grade of coal.

The Steel Mill Packing Co., Detroit, Mich., have issued a little folder descriptive of the vibrating stuffing box for stationary and marine engines. This vibrating stuffing box automatically adjusts itself to any out of line movement of the piston rod or stem. It makes no difference how much the engine is out of line, this stuffing box floats with the rod with practically no resistance. The flexibility of the stuffing box is due to the ball joint working in connection with the sliding face of flange on the stuffing box. The ball joint is kept tight and free from leakage by the steam pressure, the springs exerting only pressure enough to hold the stuffing box in place when steam is turned off. The spacing rings at each end of the packing work in connection with the packing, holding the stuffing box out of contact with the piston rod, thus preventing wear.

ADVERTISERS

The Star indicates alternate insertions, the Dagger once a month.

CLASSIFIED ADVERTISING SERVICE

PROPOSALS.

U. S. Engineer Office, Buffalo, N. Y., Jan. 14, 1908. Sealed proposals for the construction of concrete walls for Ship Lock, Black Rock Harbor, at Buffalo, N. Y., will be received at this office until 11 o'clock a. m., March 14, 1908, and then publicly opened. Information furnished on application. H. M. Adams, Col. Engrs.

U. S. Engineer Office, 57 Park street, Grand Rapids, Mich., Feb. 24, 1908. Sealed proposals for extension and repair of south pier at Frankfort, Mich., will be received here until 3 P. M., March 25, 1908, and then publicly opened. Information furnished on application. M. B. Adams, Col. Engrs.

PASSENGER BOAT WANTED

PASSENGER BOAT WANTED, length 75 to 80 ft., beam 17 to 18 ft., single deck. Give full description of hull, engine and boiler. We have a Steamer For Sale, or exchange, which is a little too large for our business. Address L. E. Eggert, Muskegon Heights, Mich.

ENGINE FOR SALE

MARINE ENGINE FOR SALE:—Heavy service Steeple Compound size 9—18½ x 14. Now being refitted throughout and put in A 1 guaranteed condition. Marine Iron Works, Station A, Chicago, Ill.

HIGH SPEED LAUNCH ENgines for sale:—New 4—8 x 5 and refitted 3—6 x 4 Fore and Aft Compound high-speed launch engines suited to highest working steam pressures. Marine Iron Works, Station A, Chicago, Ill.

KEROSENE MARINE ENGINE for sale, 60 H. P., Mietz & Weiss, 4 cylinder. Can be arranged to burn gasoline. This engine was used only a short time, and is practically good as new. Cost $3,700, will sell her for $1,850. Full particulars upon application. R. W. Herfurth Company, 39-41 Cortlandt St., New York.

STEAMERS FOR SALE.

FREIGHT AND PASSENGER steamer for sale, 500 gross tons. Allow 600 excursionists. Will sleep 75 night passengers. Address Box 123, THE MARINE REVIEW, Cleveland, O.

STEAMER FOR SALE, BUILT IN 1900, of white oak, 98 ft. long, 17½ ft. beam, 5 ft. draught, speed 12 miles on a coal consumption of 1½ tons per day, engine 12 x 22 x 12 fore and aft compound, boiler (tubular) 125 lbs. steam, allowed to carry 400 passengers. Lighted by electricity. Price $9,000. R. W. Herfurth Company, 39-41 Cortlandt St., New York.

PASSENGER STEAMER GRANdon for sale, composite build 70 ft. long, 16½ ft. beam, compound engine, independent air pump. Boiler is new 1907, allows 207 lbs. steam. Equipment is very complete. Also one lighter 100 tons capacity, built of oak, three years old. For information address Henry Freyensee, Sandusky, Ohio.

TUGS FOR SALE.

TUG FOR SALE, 40 FT. X 10 FT. beam, 3 ft. draught, engine 10 x 10, boiler 250 lbs. steam. This Tug is trunnelled, salted and coppered, cost $8,000. Price $1,500. Also one 50 x 15 ft. beam, 5 ft. draught, engine 15 x 15, 100 lbs. steam. Price $1,600. R. W. Herfurth Company, 39 Cortlandt St., New York, N. Y.

SMALL STEAM BARGE WANTED

SMALL STEAM BARGE WANTed, capable of handling four or five hundred tons package freight, or six to seven hundred tons coal on nine foot draught. Address Richelieu & Ontario Navigation Company, Montreal, Can.

HOISTING OUTFIT.

ONE COMPLETE PACKAGE freight hoisting outfit for sale, consisting of one double Trout Engine 10 x 12 cylinders, shafting, drums, etc., now in the Steamer Brazil. This equipment was used but very little and is in the best condition. For price correspond with the Wisconsin Transportation Company, Sheboygan, Wis.

FOR SALE, MISCELLANEOUS.

NEAFIE & LEVY F & A COMpound 26"-50" x 30" with Surface Condenser and Pumps. Will alter to 22"-50" x 30" for high steam.

13½ K. W. Electric Lighting Set.

Williamson Steering Engine.

Two Hawser Pullers (Capstans).

Two Providence Steam Windlasses.

Wheeler Surface Condenser.

Blake Vertical Duplex Air Pump and Jet Condenser. 7½" steam, 16" air, 12" stroke.

Worthington Duplex Air Pump & Jet Condenser 9" x 12" x 10".

D. C. Sturtevant Blower & Engine.

Two Scotch Boilers 12' x 12'.

Two Scotch Boilers 11' x 12'.

Two Scotch boilers 13½' x 12'.

MARVIN BRIGGS, INC.,
154 Nassau Street, New York.

JET CONDENSER FOR SALE:—Worthington special for high pressure. Size 5—7 x 10. In A1 guaranteed condition. Marine Iron Works, Station A, Chicago, Ill.

DREDGE FOR SALE. TWO-YARD dipper dredge with two 115-yard scows all in good shape. For further particulars address Box 126, the MARINE REVIEW, Cleveland, Ohio.

BOILERS FOR SALE

ROBERTS BOILER FOR SALE:—Now being rebuilt. Size 6ft. x 8ft. Licensed steam pressure 200 lbs. Boiler in perfect condition and complete shape. Marine Iron Works, Station A, Chicago, Ill.

TWO SCOTCH MARINE BOILERS FOR sale, built in 1895, diameter 10 ft., length 11 ft., with one set new tubes for boilers; corrugated furnaces, renewed one year ago. Also one upright boiler, diameter 30 in., height 5½ ft., built in 1898. Further information furnished on application. Address U. S. Engineer Office, Galveston, Tex.